MPC8568E MDS Processor Board

User's Guide

Rev. 0.3
06/2007

freescale™
semiconductor

Chapter 1
General Information

1.1 Introduction 1-1
1.2 Working Configurations 1-2
1.2.1 Stand-Alone Mode (host) 1-2
1.2.2 PIB Combined Mode (host or agent) 1-2
1.2.3 With PCI-express and/or sRIO (host or agent) 1-2
1.2.4 As an agent in a PC 1-2
1.3 MPC8568E MDS Processor Board 1-2
1.3.1 Features 1-2
1.3.2 External Connections 1-4
1.3.3 Block Diagram 1-6
1.4 Definitions, Acronyms, and Abbreviations 1-7
1.5 Related Documentation 1-8
1.6 Specifications 1-9

Chapter 2
Hardware Preparation and Installation

2.1 Unpacking Instructions 2-1
2.2 Installation Instructions 2-1
2.2.1 For Stand-Alone Mode (processor board as host) 2-1
2.2.2 For PIB Combined Mode 2-3
2.2.2.1 Processor Board as Host on PIB 2-3
2.2.2.2 Processor Board as an agent on the PIB 2-9
2.2.3 For PCI-express 2-13
2.2.4 For sRIO 2-18
2.2.5 In a PC 2-20

Chapter 3
Memory Map

3.1 MPC8568E MDS Processor Board Mapping 3-1

Chapter 4
Controls and Indicators

4.1 DIP Switches 4-1
4.2 Jumpers 4-6
4.3 LEDs 4-7
4.4 Other Controls and Indicators 4-9
4.4.1 Push Buttons 4-9

Chapter 5
Functional Description

5.1 Reset & Reset - Configuration 5-1
5.1.1 Reset Clocking and Configuration Initialization 5-1
5.1.2 Reset Circuit 5-3
5.1.3 MPC8568E MDS Processor Board Reset Principles 5-4
5.1.4 Power-On Reset 5-4
5.1.5 Hard Reset. 5-4
5.1.6 COP/JTAG Port Hard - Reset (stand-alone only). 5-4
5.1.7 Soft Reset 5-5
5.2 Default Settings. 5-5
5.3 Clocking 5-5
5.4 Board Control & Status Registers (BCSR) - CPLD device 5-7
5.4.1 Programming the BCSRs via the Ethernet port, Ethernet Tap, or Serial port 5-8
5.4.2 Programming the BCSRs via the USB Tap 5-8
5.4.3 BCSR0 - Board Control / Status Register - 0 5-10
5.4.4 BCSR1 - Board Control / Status Register - 1 5-10
5.4.5 BCSR2 - Board Control / Status Register - 2 5-11
5.4.6 BCSR3- Board Control / Status Register - 3 5-11
5.4.7 BCSR4- Board Control / Status Register - 4 5-12
5.4.8 BCSR5 - Board Control / Status Register - 5 5-13
5.4.9 BCSR6 - Board Control / Status Register - 6 5-14
5.4.10 BCSR7 - Board Control / Status Register - 7 5-15
5.4.11 BCSR8 - Board Control / Status Register - 8 5-15
5.4.12 BCSR9 - Board Control / Status Register - 9 5-16
5.4.13 BCSR10 - Board Control / Status Register - 10 5-17
5.4.14 BCSR11 - Board Control / Status Register - 11 5-17
5.4.15 BCSR14 - Board Control / Status Register - 14 5-19
5.5 External Connections 5-20
5.5.1 P1 - DUART Port 5-21
5.5.2 P3 - SMB Connector. 5-21
5.5.3 P4 - CPLD's In-System-Programming (ISP) 5-21
5.5.4 P5 - Debug COP Connector 5-22
5.5.5 P6 - PCI Express socket 5-23
5.5.6 P7 - sRIO Connector. 5-23
5.5.7 P8 - Power Connector. 5-23
5.5.8 P9 - Power Connector. 5-23
5.5.9 J3,J8,J10,J12- GETH/eTSEC Port Connectors. 5-23
5.6 PCI 5-24
5.6.1 General 5-24
5.6.2 PCI Setting when MPC8568E MDS Processor Board is Host. 5-24
5.6.3 PCI Setting when MPC8568E MDS Processor Board is Agent. 5-25
5.7 PCI Express (PCIe) and Serial Rapid IO (SRIO) 5-25
5.7.1 General 5-25

5.7.2 Block Diagram 5-25
5.8 PCI_PCIe Adapter 5-26
5.9 DDR 5-27
5.10 Local Bus 5-28
5.10.1 Address Latch/ Data Transceiver 5-28
5.10.2 SDRAM 5-29
5.10.3 Flash Memory 5-30
5.11 GETH 5-30
5.11.1 GMII Interface 5-31
5.11.2 Ten Bit Interface (TBI) 5-31
5.11.3 Reduced Pin Count GMII (RGMII) 5-32
5.11.4 Reduced Ten Bit Interface (RTBI) 5-33
5.11.5 MII Interface 5-34
5.11.6 Working with TDM, I2C, UART, SPI, UCC, UPC, and the PIB 5-35
5.11.7 RMII via the PIB 5-49
5.12 Debugging Applications 5-49
5.12.1 Stand-Alone, Host/Agent on PIB, Independent Host, PCIe/sRIO Agent 5-49
5.12.2 Inserted in a PC 5-50
5.13 UART Ports 5-50
5.14 I2C (Dual) Port 5-51
5.14.1 I2C-1 5-51
5.14.2 I2C-2 5-52
5.15 External Interrupts 5-52
5.15.1 PIB Interrupt 5-52
5.15.2 PCI Interrupt 5-52
5.15.3 RTC Interrupt 5-53
5.15.4 FLASH Interrupt 5-53
5.15.5 JTAG/COP Interrupt 5-53
5.15.6 GETH Interrupt 5-53
5.16 Power Supply 5-53
5.16.1 Primary Power Supply 5-53
5.16.2 MPC8568E MDS Processor Board Power Supply Structure 5-53
5.16.3 Power Supply Operation 5-54

Chapter 6
Working with the PIB

6.1 Platform I/O Board Concept 6-1
6.2 MPC8568E MDS Processor Board as Host on PIB 6-2
6.3 MPC8568E MDS Processor Board as Agent on PIB 6-3
6.4 Working with a TDM module on the PIB 6-3
6.4.1 Installing the PMC-to-PMC adaptor 6-3
6.4.2 Signals on the PMC-to-PMC adaptor 6-5
6.5 MPC8568E MDS Processor Board - PIB Signals 6-7

Chapter 7
Replacing Devices

7.1 Replacing Flash Memory 7-1
7.1.1 Cleaning Flash Memory 7-2
7.2 Replacing SODIMM unit 7-3
7.3 Replacing MPC8568E Processor 7-4

Chapter 1
General Information

1.1 Introduction

The MPC8568E MDS Processor Board is an application development system that provides a complete debugging environment for engineers developing applications for the MPC8568 series of Freescale processors. This document describes the MPC8568E MDS Processor Board, and how it works in its stand-alone operating mode, as an agent via a PCI slot in a PC, as a host on the “PowerQUICC MDS Platform I/O Board (PIB)”, as an agent on the PIB, as an sRIO host and agent, and as a PCIe root complex and endpoint.

The MPC8568E integrates an e500 processor core based on Power Architecture™ technology with system logic required for networking, telecommunications, and wireless infrastructure applications. The MPC8568E is a member of the PowerQUICC™III family of devices that combine system-level support for industry-standard interfaces with processors that implement the Power Architecture technology.

In addition, the MPC8568E offers a double-precision floating-point auxiliary processing unit (APU), 512 Kbytes of level-2 cache, QUICC Engine, two integrated 10/100/1Gb enhanced three-speed Ethernet controllers (eTSECs) with TCP/IP acceleration and classification capabilities, a DDR/DDR2/FCRAM1™/FCRAM2™ SDRAM memory controller, a 32-bit PCI controller, a programmable interrupt controller, two I2C controllers, a four-channel DMA controller, an integrated security engine with XOR acceleration, a general-purpose I/O port, and dual universal asynchronous receiver/transmitters (DUART). For high speed interconnect, the MPC8568E provides a set of multiplexed pins that support two high-speed interface standards: 1x/4x serial RapidIO (with message unit), and up to x8 PCI Express.

The MPC8568E MDS Processor Board includes various peripherals, such as data input/output devices (GETH, DUART), memories (DDR, SDRAM, Serial EEPROM, FLASH and BCSR registers), PCI, PCI Express, and serial RapidIO connections, in addition to control switches and LED indicators.

Using its on-board resources and debugging devices, a developer is able to upload code, run the code, set breakpoints, display memory & registers and connect his own proprietary hardware to be incorporated into a target system that uses the MPC8568E as a processor.

The software application developed for the MPC8568E can be run in a "bare bones" operation (with only the MPC8568E processor), or with various input or output data streams, such as from the GETH connection, PCI, PCIe, or sRIO connections. Results can be analyzed using the *Code Warrior*® debugger in addition to using other methods for directly analyzing the input or output data stream. The BSP is built using the Linux OS.

This board can also be used as a demonstration tool for the developer. For instance, the developer's application software may be programmed into its Flash memory and run in exhibitions.

1.2 Working Configurations

1.2.1 Stand-Alone Mode (host)

The MPC8568E MDS Processor Board can be run in a stand-alone mode, like other application development systems, with direct connections to debuggers (via a JTAG/COP connector and JTAG/Parallel Port command converter), power supply, and the GETH, and Dual RS-232 (DUART) connections. In this mode, the MPC8568E MDS Processor Board acts as a Host.

1.2.2 PIB Combined Mode (host or agent)

The MPC8568E MDS Processor Board can be connected to the PIB (the Platform I/O Board), which provides room and connections for additional modules - these are PCI compatible devices such as (but not limited to) additional Processor Boards from the MPC8Xxx family (acting as Agents). This capability expands the communication and interface capabilities of the MPC8568E MDS Processor Board.

Power for the MPC8568E MDS Processor Board in this case is provided via the PIB. The PIB also provides an additional 2x4 twisted pair for QE GETH signals to be connected via the back plane (if used). Optical signals via 2x SFP connectors for QE GETH on the front plane side of the PIB are also provided.

1.2.3 With PCI-express and/or sRIO (host or agent)

The MPC8568E MDS Processor Board can function as a host (or root complex) to an agent (or end-point) Processor Board, connected to the PCIe socket or the sRIO socket. It is also possible to connect any PCIe-compatible device to the PCIe socket.

1.2.4 As an agent in a PC

In this mode, the MPC8568E MDS Processor Board acts as an Agent.

Using its PCI_PCIe adaptor, the MPC8568E MDS Processor Board can be inserted into a PC. Both power and debugging are supplied via the PCI edge of the PCI_PCIe adaptor. If the (agent) processor board is inserted into a PC using the PCIe edge of the PCI-PCIe adaptor, an addition power cable must be connected to the PC (see Section 2.2.5 for more details). Other external connections are the same as in the Stand-Alone Mode.

1.3 MPC8568E MDS Processor Board

1.3.1 Features

- Supports MPC8568E running up to 1.00 GHz at 1.1V Core voltage.
- DDR 72-bit on SODIMM, at a rate up to 533MHz
- PCI edge connector (via additional adaptor) interfaces with 32bit PCI bus (used when inserted in a PC, or as an agent on the PIB).

- PCI-express edge connector (via additional adaptor) interfaces with x4 PCIe (used when inserted in a PC, or as an agent on a host MPC8568E MDS Processor Board)
- Two 10/100/1000Mb/sec Ethernet Phys on QE GETH ports.
- Two eTSEC (from UCC1 and UCC2) ports.
- Dual RS232 transceiver on one DUART port.
- Local Bus interface:
  - 100MHz SDRAM memory (implemented using three units), 64Mbyte size with parity.
  - One 32Mbyte (expandable) Flash with 16bit port size in socket.
  - Address Latch and Buffers to support slow devices on the PIB Board.
- Four Hi-speed Riser Connectors to enable connection to the PIB Board.
- Debug port access via dedicated 16-pin connector (COP)
- One I2C port for boot EEPROM 256Kbit, Real Time Clock (RTC), core voltage potentiometer, and SODIMM SPD EEPROM - A second I2C port is used to connect to the Board Revision Detect 256Kbyte EEPROM.
- Can function in one of four configurations:
  - Stand-alone.
  - Host mode on PIB (PIB combined mode - development platform with Processor Board (as a Host) and PIB connected together)
  - Independent host mode (as a “root complex” for an additional processor board connected to the PCIe socket, or to the sRIO socket)
  - Agent mode (either a PCI agent in the PIB or in a PC, a PCIe end-point connected to a root complex processor board, or as an sRIO agent connected to a host processor board)
- Board Control and Status Register (BCSR) implemented in Altera CPLD.
- Three power options:
  - Main 5V power is fed from external power supply for stand-alone mode.
  - Power from PC supply when acting as a PCI add-in card.
  - Power from the PIB when PIB and Processor Boards are combined.
- PCI add-in card form factor dimensions: 285mm x 106mm.

1.3.2 External Connections

The MPC8568E MDS Processor Board interconnects with external devices via the following set of connectors:

- P1 - RJ45 (10-pin) for DUART signals
- P3 - SMB RF Connector for external pulse generator
- P4 - 16-pin header for CPLD In-System Programming (device U76)
- P5 - 16-pin COP/JTAG Connector
- P6 - PCI Express (x4) socket
- P7 - SRIO HIP Connector
- P8 - 5V Voltage Input
- P9 - 12V Voltage Input
- P12,P13,P14,P15 - 300-pin FCI Expansion Connectors.
- J3,J8 - RJ45 8-pin QE Gigabit Ethernet Connectors.
- J10,J12 - RJ45 8-pin eTSEC Connectors.

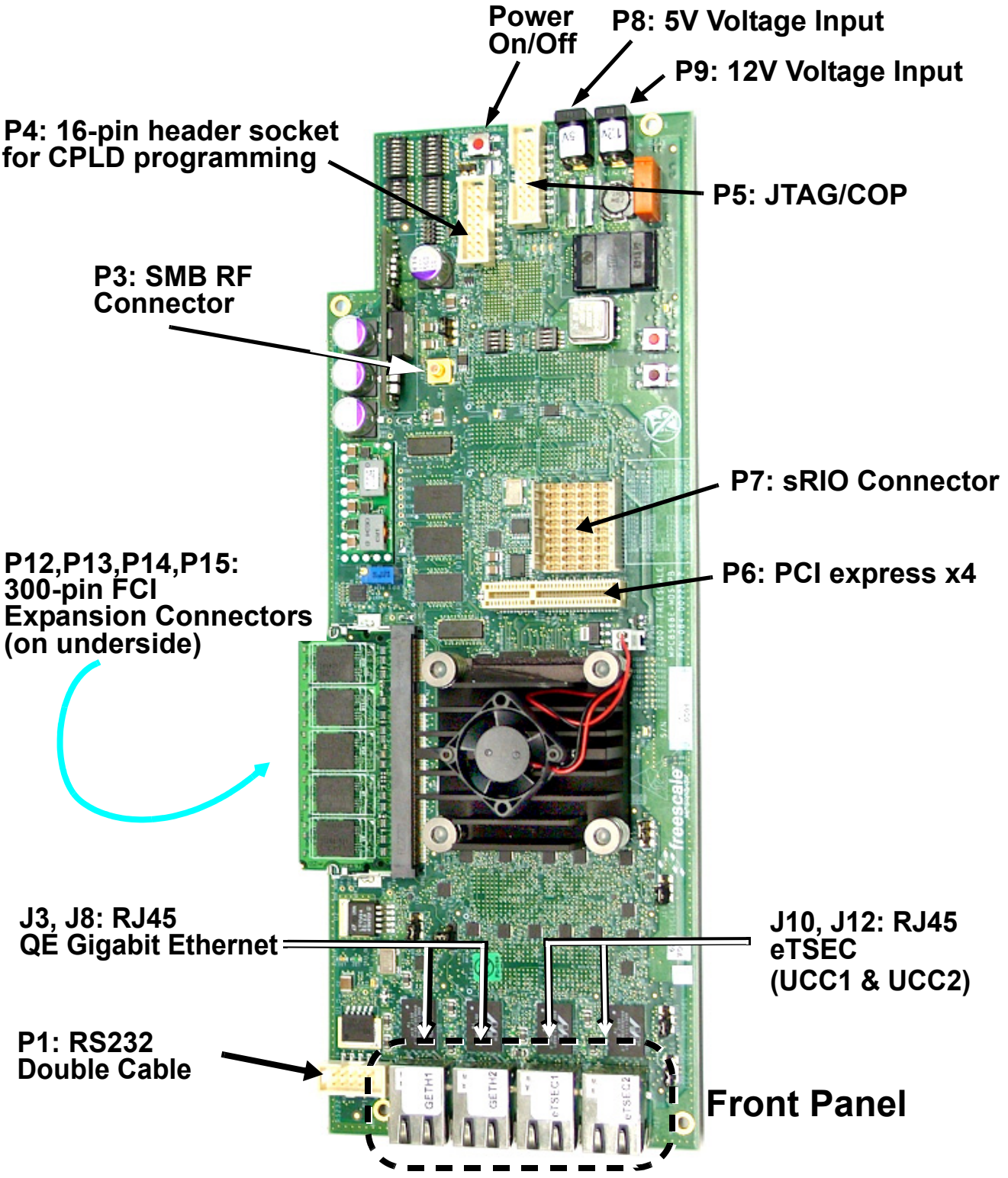

Power On/Off
P8: 5V Voltage Input
P9: 12V Voltage Input
P4: 16-pin header socket for CPLD programming
P5: JTAG/COP
P3: SMB RF Connector
P7: sRIO Connector
P6: PCI express x4
P12,P13,P14,P15: 300-pin FCI Expansion Connectors (on underside)
J3, J8: RJ45 QE Gigabit Ethernet
J10, J12: RJ45 eTSEC (UCC1 & UCC2)
P1: RS232 Double Cable
Front Panel

Figure 1-1. MPC8568E MDS Processor Board External Connections

1.3.3 Block Diagram

The block diagram of the MPC8568E MDS Processor Board is shown below in Figure 1-2.

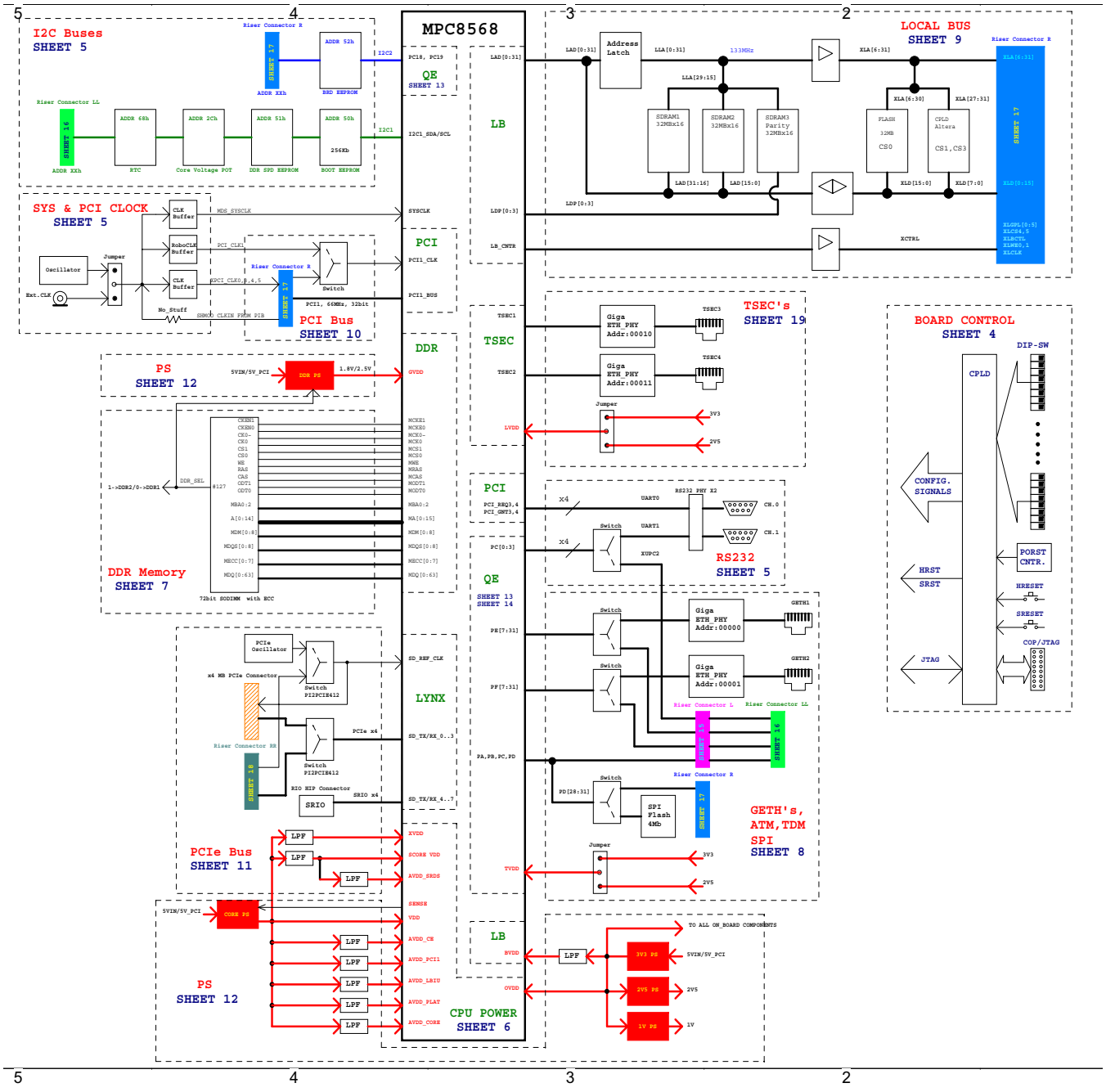


Figure 1-2. MPC8568E MDS Processor Board Block Diagram

1.4 Definitions, Acronyms, and Abbreviations

BCSR	Board Control and Status Register
BRD	Board Revision Detect (I2C EEPROM)
BSP	Board Support Package
COP	Common On-chip Processor (JTAG Debug Port)
CPLD	A type of register
CS	Chip Select
CW	*Code Warrior*® IDE for PowerPC
DAC	Digital-to-Analog Converter
DDR	Double Data Rate
DIP	Dual-In-Line Package.
DMA	Direct Memory Access
DUART	Dual UART
EEPROM	Electrical Erasable Programmable Memory
FCFG	Flash Configuration Select
FCI	Type of Riser Connector
FLASH	Non volatile reprogrammable memory.
FPGA	Field-Programmable Gate Array
GbE	Gigabit Ethernet
GETH	Gigabit Ethernet
GMII	General Media Independent Interface
GPCM	General Purpose Chip-select Machine
GPL	General Purpose Line
I2C	Philips Semi Serial Bus
LBIU	Local Bus Interface Unit
LED	Light Emitting Diode
lsb	least significant bit
MDS	Modular Development System
MII	Media Independent Interface
JTAG	Joint Test Access Group
OTG	On-the-Go
PB	Processor Board
PC	IBM-compatible Personal Computer

PCI	Peripheral Components Interconnect
PCIe	PCI express
Phy	Physical Layer
PIB	Platform I/O Board - expands the ADS functionality.
PLL	Phased Lock Loop
POR	Power-on reset
POS	Packet-over-SONET
PSRAM	Pseudo-Static Random Access Memory
PSU	Power Supply Unit
QE	Freescale's QUICC-Engine chip
RCW(L,H)	Reset Configuration Word (Low/High)
RGMII	Reduced General Media Independent Interface
RTC	Real Time Clock
SDRAM	Synchronous Dynamic Random Access Memory
SMB	Type of Mini-RF connector
SODIMM	Mini DIMM Form Factor
SPD	Serial Present Detect
sRIO	Serial Rapid Input/Output
TSEC	Triple Speed Ethernet Controller
UCC	
ULPI	UTMI+ Low Pin Interface
UPM	User Programmable Machine
USB	Universal Serial Bus
ZD	Zero Delay clock buffer, with internal PLL for skew elimination

1.5 Related Documentation

- MPC8568E HW Specification
- MPC8568E Reference Manual
- PowerQUICC MDS Platform I/O Board User's Manual
- MPC8568E Hardware Getting Started
- MPC8568E MDS Processor Board Kit Configuration Guide

1.6 Specifications

The MPC8568E MDS Processor Board specifications are given in Table 1-1.

Table 1-1. MPC8568E MDS Processor Board specifications

CHARACTERISTICS	SPECIFICATIONS
Power requirements	Stand-Alone, Independent Host, or as a PCIe or sRIO Agent (not in PC): 5V @ 8A external DC power supply PIB Combined Mode: Power supplied by PIB Working in PC: Power supplied by PC
MPC8568E processor	Internal clock runs at 1.00GHz @ 1.1V
Memory: One DDR bus	512MB space 72bit wide in one SODIMM-200. Data rate 533MHz.
Local Bus: SDRAM Buffered Memory (Flash on socket): BCSR on CPLD Expansion	64MB space 32bit wide + 4bit parity implemented in three SDRAM parts. 100MHz clock. 32MB space 16bits wide. 16-registers, 8bits wide. Four banks with 16bit- Address bus, 16bit- Data bus connected to riser connectors
Operating temperature	0^{O}C - 70^{O}C
Storage temperature	-25^{O}C to 85^{O}C
Relative humidity	5% to 90% (non-condensing)
Dimensions (according to PCI 64-bit Add-in-card form factor, not including heat-sink): Length Width Height	 285 mm 106 mm 16 mm

Chapter 2
Hardware Preparation and Installation

This chapter provides unpacking instructions, hardware preparation, and installation instructions for the MPC8568E MDS Processor Board, including all four configurations: Stand-Alone, PIB Combined Mode, Independent Host Mode, and Agent Mode (either on the PIB, inserted in a PC, directly connected to a Host processor board via the PCI express socket, or connected to a Host processor board via an sRIO cable).

2.1 Unpacking Instructions

NOTE

If the shipping carton is damaged upon receipt, request carrier's agent to be present during unpacking and inspection of equipment.

CAUTION

AVOID TOUCHING AREAS OF INTEGRATED CIRCUITRY; STATIC DISCHARGE CAN DAMAGE CIRCUITS.

1. Unpack equipment from shipping carton.
2. Refer to packing list and verify that all items are present.
3. Save packing material for storing and reshipping of equipment.

2.2 Installation Instructions

Do the following ***in the order indicated*** to install the MPC8568E MDS Processor Board properly:

1. Verify that Jumpers and Switches are in default positions (see Chapter 4, *"Controls and Indicators"* for a list of default positions).
2. Determine in which working configuration you will operate the MPC8568E MDS Processor Board:
   - Stand-Alone - continue from Section 2.2.1
   - PIB Combined Mode, with the PIB Board - continue from Section 2.2.2
   - Working with PCI-express (as a host or as an agent)- continue from Section 2.2.3
   - Working with sRIO (as a "root complex" or as an "endpoint") - continue from Section 2.2.4
   - Working as an agent in a PC - continue from Section 2.2.5

2.2.1 For Stand-Alone Mode (processor board as host)

1. *For Stand-Alone Mode only*: Fasten the four plastic spacers. See Figure 2-1 and Figure 2-2. Note that the smaller spacer is to be fastened to the underside of the board, as shown in the figures.
2. Connect external cables in accordance with your development needs (see Section 1.3.2 *External Connections* for locations of sockets).

3. Connect power supply (to 5V jack), and press the ON/OFF button (SW5), ensuring that the power is ON.
4. Reset the board, and verify that the power-on-reset sequence is carried out properly: LD1 briefly displays light, afterwhich LD2 and LD7 are constantly lit. (see Figure 2-3 for location). This indicates that the board has successfully completed the boot-up sequence.
5. Continue operation according to instructions in the *Kit Configuration Guide*.

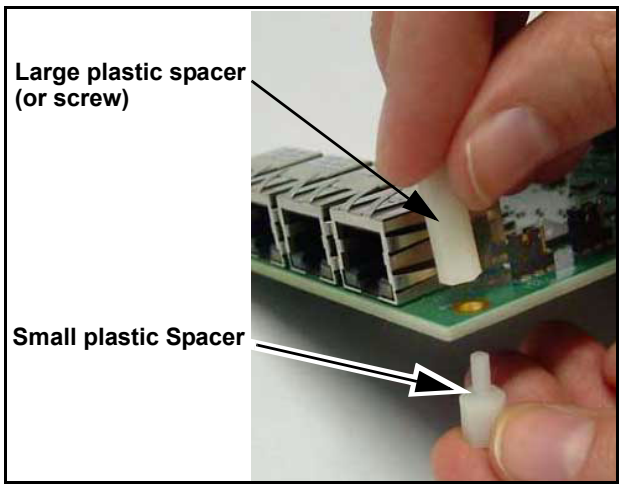


Figure 2-1. Fastening the plastic spacers

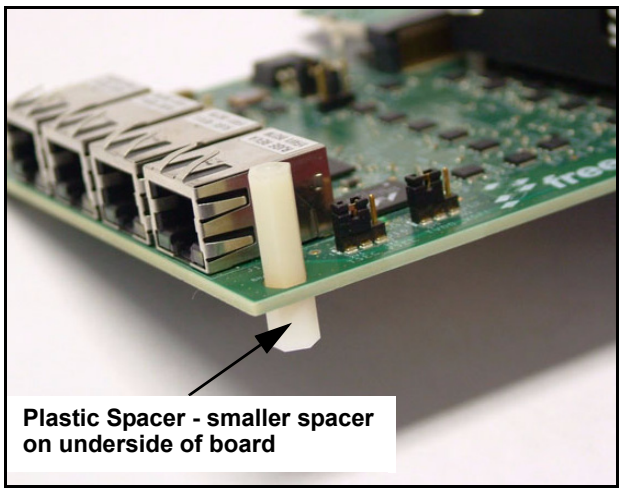


Figure 2-2. Plastic spacers fastened

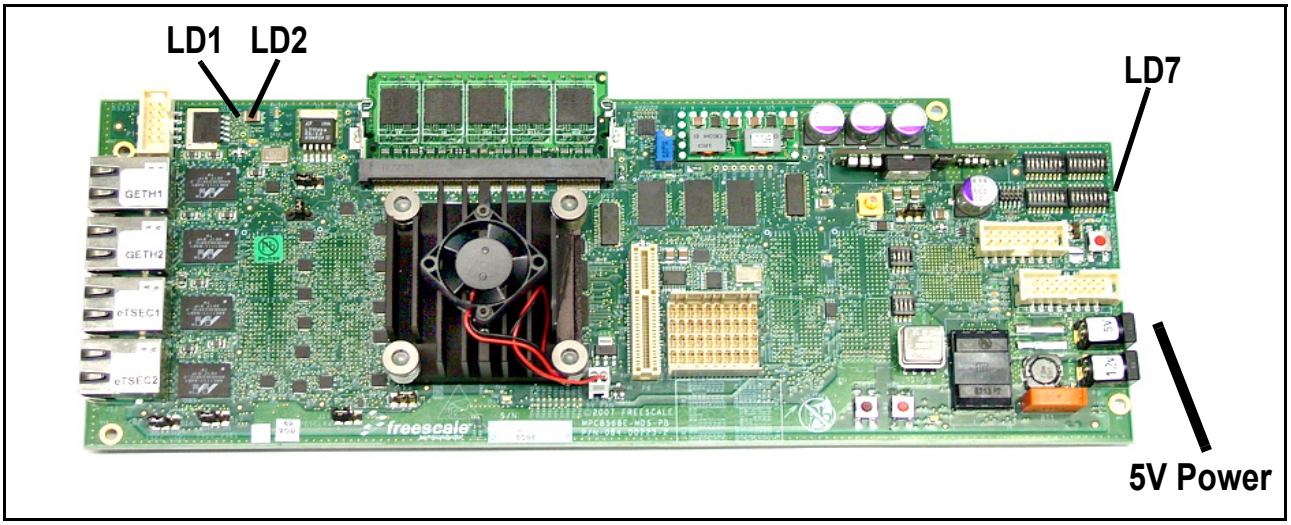


Figure 2-3. Boot-Up sequence: LD1 turns on then off, then LD2 and LD7 remain on

2.2.2 For PIB Combined Mode

2.2.2.1 Processor Board as Host on PIB

1. Remove protective covers from the 300-pin connectors (P12, P13, P14, P15) on the bottom side of the processor board (See Figure 2-4.).
2. Remove protective covers from the 300-pin connectors on the PIB board (see Figure 2-5).

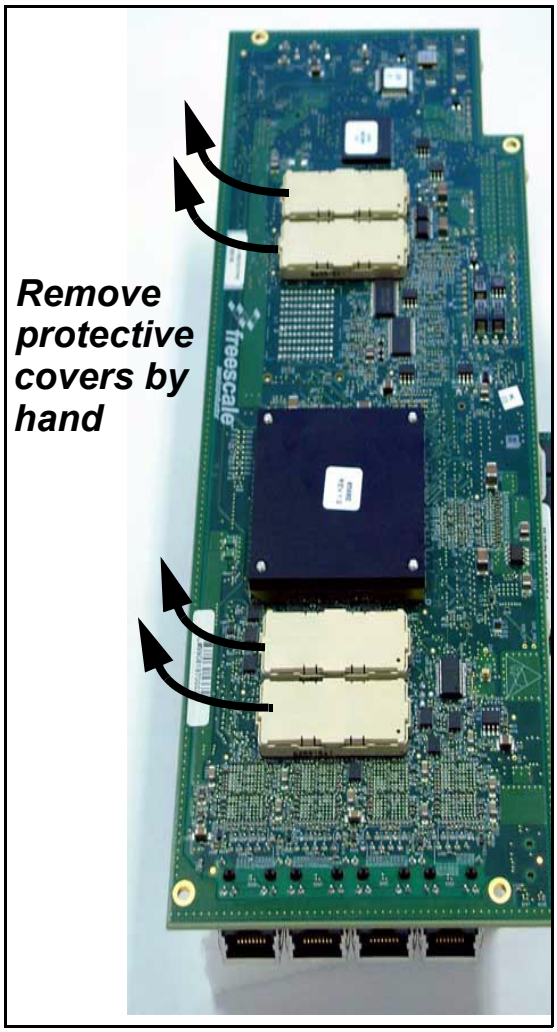


Figure 2-4. Remove Protective Covers from 300-pin connectors on underside of processor board (P12, P13, P14, P15)

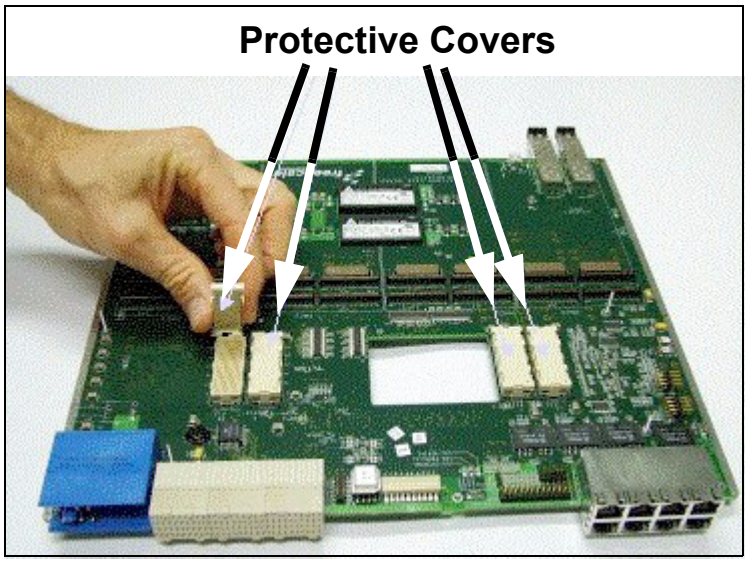


Figure 2-5. Remove Protective Covers from 300-pin connectors on PIB

3. Fasten processor board to PIB board as shown in Figure 2-6.
4. Ensure a tight fit by pressing down on the processor board **by hand only** until the pins engage.
5. Tighten screws to ensure a secure fit of the processor board on the PIB.

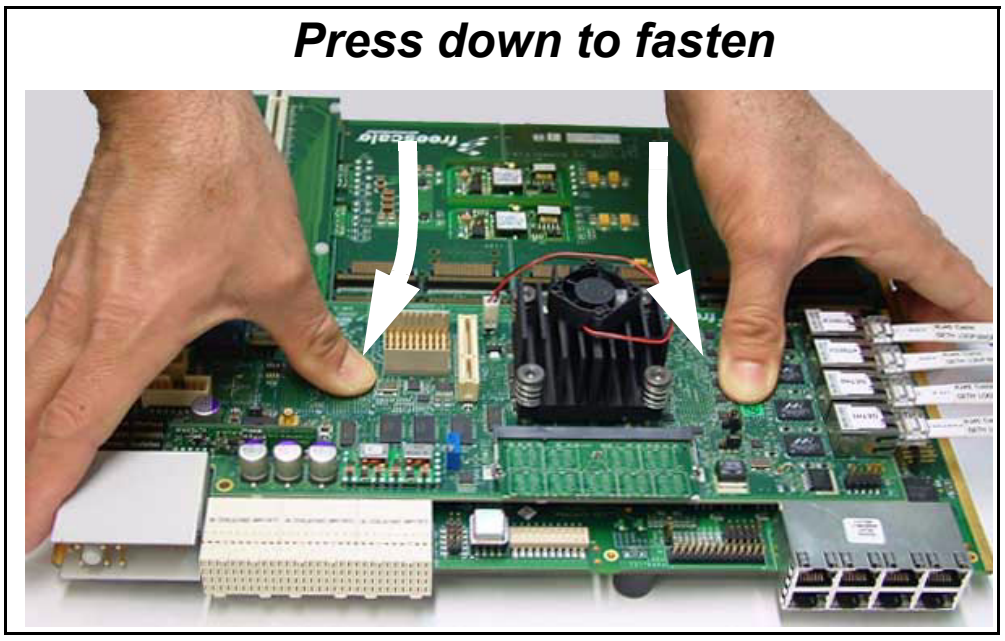


Figure 2-6. Connect Processor board to PIB and press down manually

6. If you will be working with a back plane, and wish GETH signals to traverse either the back plane connection, or the front plane optical connection, connect two GETH sockets on the MPC8568E MDS Processor Board with sockets on the PIB board as shown in Figure 2-7 and Figure 2-8. The only communication connection between boards connected to a back plane is via the GETH signals.

   Note that if you do not do this, you can still connect GETH cables directly to the Processor board's sockets, if they are accessible in your development configuration.
7. Connect the power supply to the voltage input as shown in Figure 2-9.

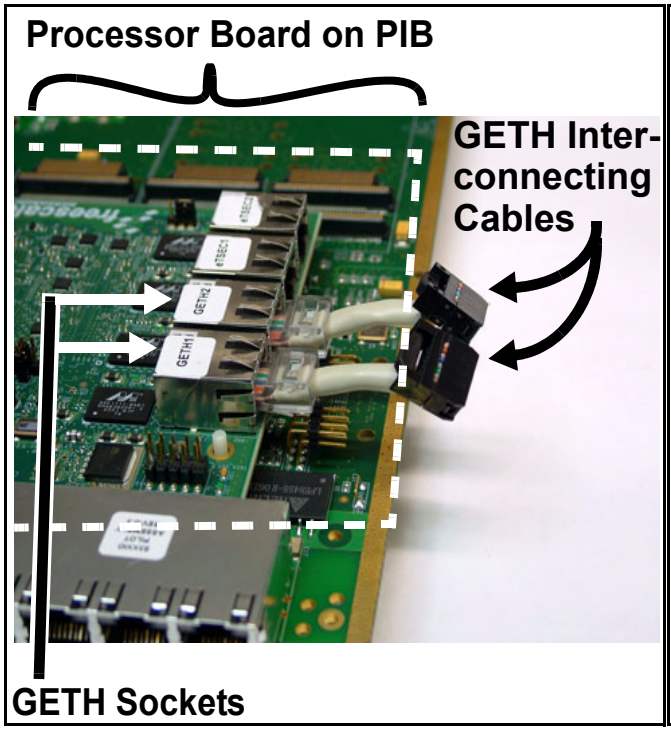


Figure 2-7. Connect GETH sockets on processor board to GETH pins on PIB

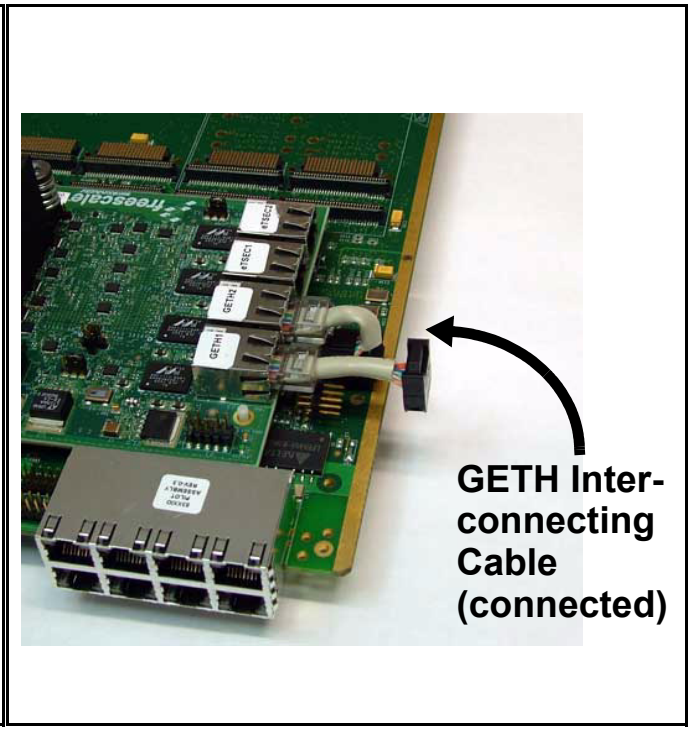


Figure 2-8. Connect GETH interconnecting cables to sockets on PIB

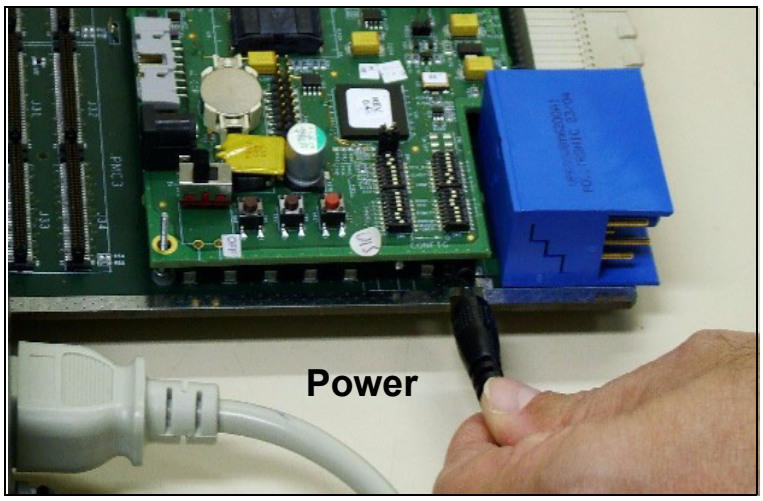


Figure 2-9. Connecting Power input to the PIB

8. If you wish to work with a module inserted in a PCI adaptor, follow the illustrations in Figure 2-11, Figure 2-12, and Figure 2-13 to fasten up to three PCI adaptors (one shown in Figure 2-10) to the PIB:
   a) Fasten each PCI adaptor to the PIB (by hand),
   b) Insert spacers between each adaptor and the PIB,
   c) Tighten them using screws (provided).

   Each PCI adaptor allows you to insert a PCI-compatible module, and use it as an agent, while an MPC8568E MDS Processor Board functions as the host.

   An example of inserting a module in a PCI adaptor is shown in Figure 2-19 on page 2-12. The PCI adaptors can be inserted in the PMC1, PMC2, and/or PMC3 slots, for up to 3 PCI adaptors, if space allows.

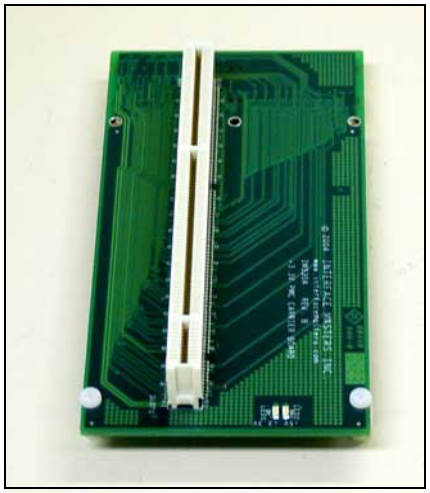


Figure 2-10. PCI Adaptor

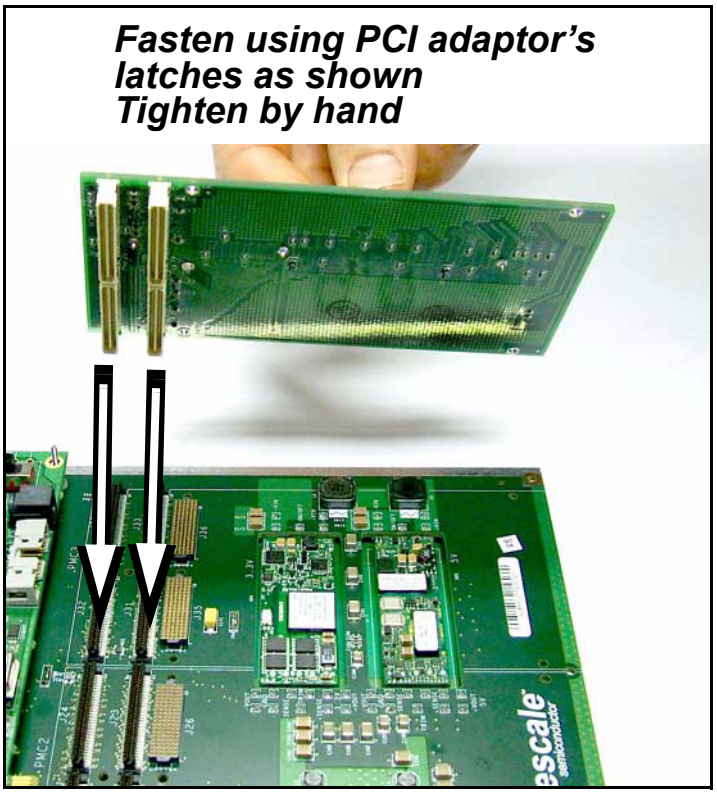


Figure 2-11. Fastening PCI adaptor to PIB

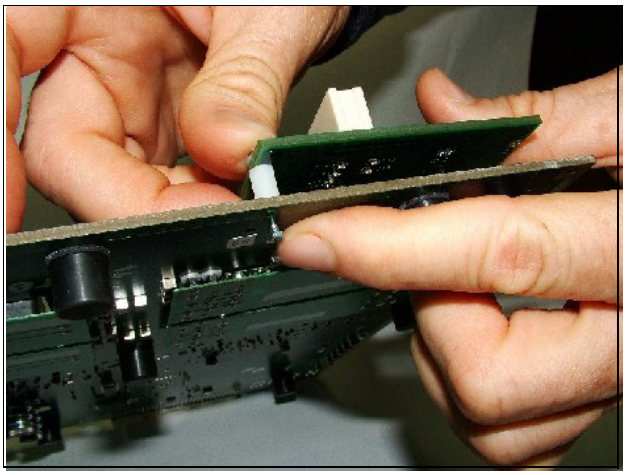


Figure 2-12. Inserting spacers between PCI adaptor and PIB

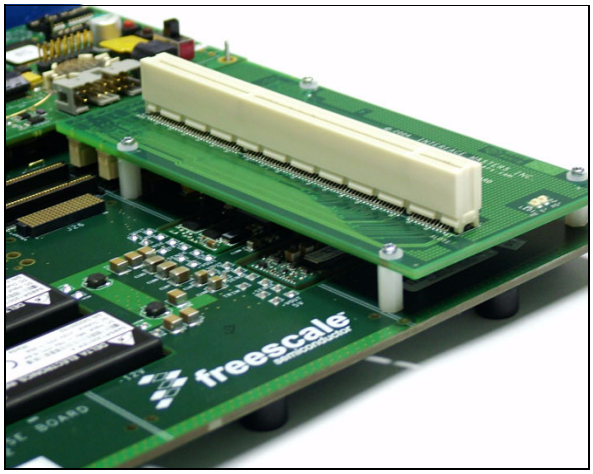


Figure 2-13. PCI adaptor fastened to PIB

9. A fully assembled PIB-Processor board combination is shown in Figure 2-14.

   All external connections of the Processor board are active when the Processor board is installed on the PIB, except the voltage input (the Processor board receives power from the PIB power input, or the back plane only).

   In Figure 2-14, one PCI adaptor and one additional module are shown installed on the PIB. The PCI adaptor is ready to receive any PCI-compatible board, including an 8Xxx Processor board. Using this system, these board(s) function as agents, while the Processor board already installed functions as a host. This allows you to take advantage of the parallel processing capabilities of the 8Xxx line of products.

   Modules that can be used with the MPC8568E MDS Processor Board on the PIB are:

   — E1/T1 - in the PMC0 slot only

   — Quad OC3 - in the PMC0 or PMC1 slot only

10. Connect external cables in accordance with your development needs.
11. Reset the board, and verify that LD1 turns on and then turns off (see Figure 2-3 on page 2-2 for location). It should be on for only a few moments. Then verify that LD2 and LD7 are on, and stay on. This indicates that the board has successfully undergone the boot-up sequence, and is ready for work.
12. Continue operation according to instructions in the *Kit Configuration Guide*.

.

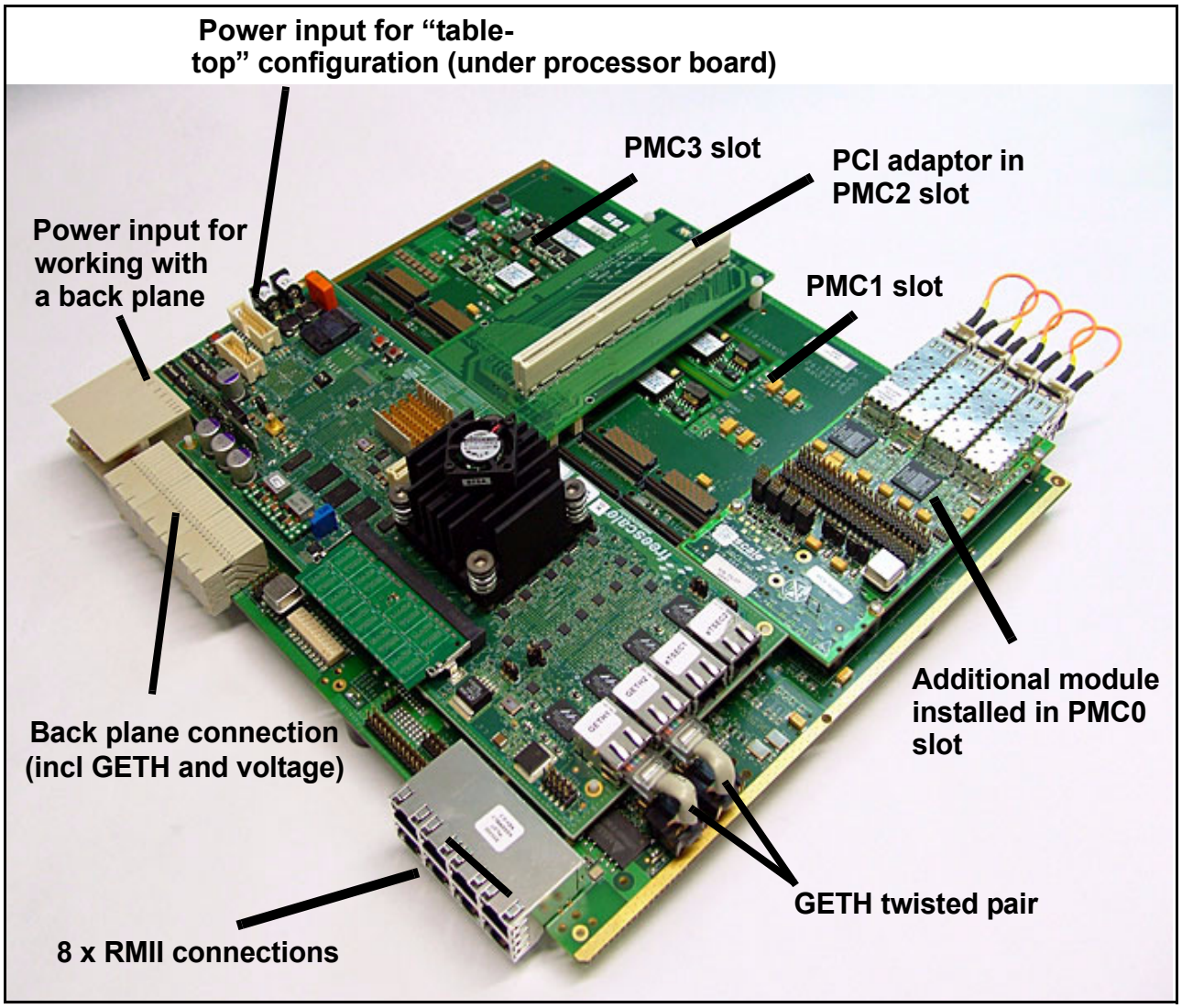


Figure 2-14. Fully Assembled Combined system:
PIB, Processor Board, additional module, and PCI adaptor

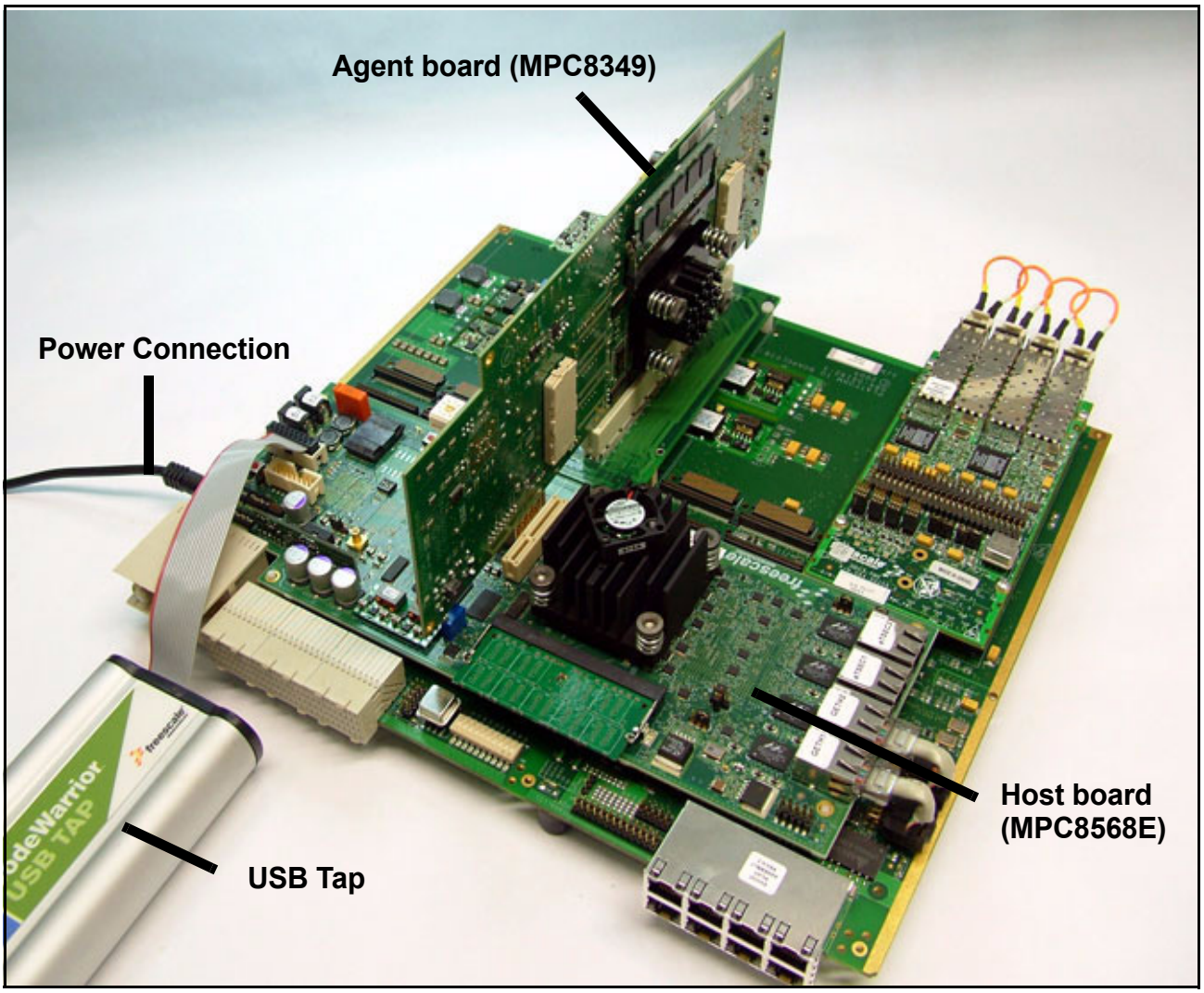


Figure 2-15. Fully Assembled Combined system, with MPC8568E as host, MPC8349 board as agent, and USB Tap connected.

2.2.2.2 Processor Board as an agent on the PIB

1. Configure the agent board as follows: set SW2.4-SW2.6 (see *SW2 Configuration* on page 4-3) to '110' (to be an agent of a PCI host only), or to '100' (to be an agent of a PCI host and an sRIO host). Reset the board for these settings to take affect.
2. Fasten the PCI_PCIe adaptor (see Figure 2-16 on page 2-10) to the underside of the MPC8568E MDS Processor Board, as shown in Figure 2-17 on page 2-11 and Figure 2-18 on page 2-11.
3. Insert a PCI adaptor into the PIB (as shown in Figure 2-11 and Figure 2-12 on page 2-7) in the PMC slot in which you want to install the agent board. See Figure 2-14 (above) for indications of the PMC slot numbering.
4. Using the PCI_PCIe adaptor's PCI edge connector, insert the Processor Board into a PCI adaptor as shown in Figure 2-19 on page 2-12.

5. Connect external cables in accordance with your development needs.
6. Reset the agent board, and verify that the power-on-reset sequence is carried out properly: LD1 briefly displays light, afterwhich LD2 and LD7 are constantly lit. (see Figure 2-3 on page 2-2 for location). They should be on for only a few moments. This indicates that the board has successfully completed the boot-up sequence. Note that power is supplied from the PIB.
7. Continue operation according to instructions in the *Kit Configuration Guide*.

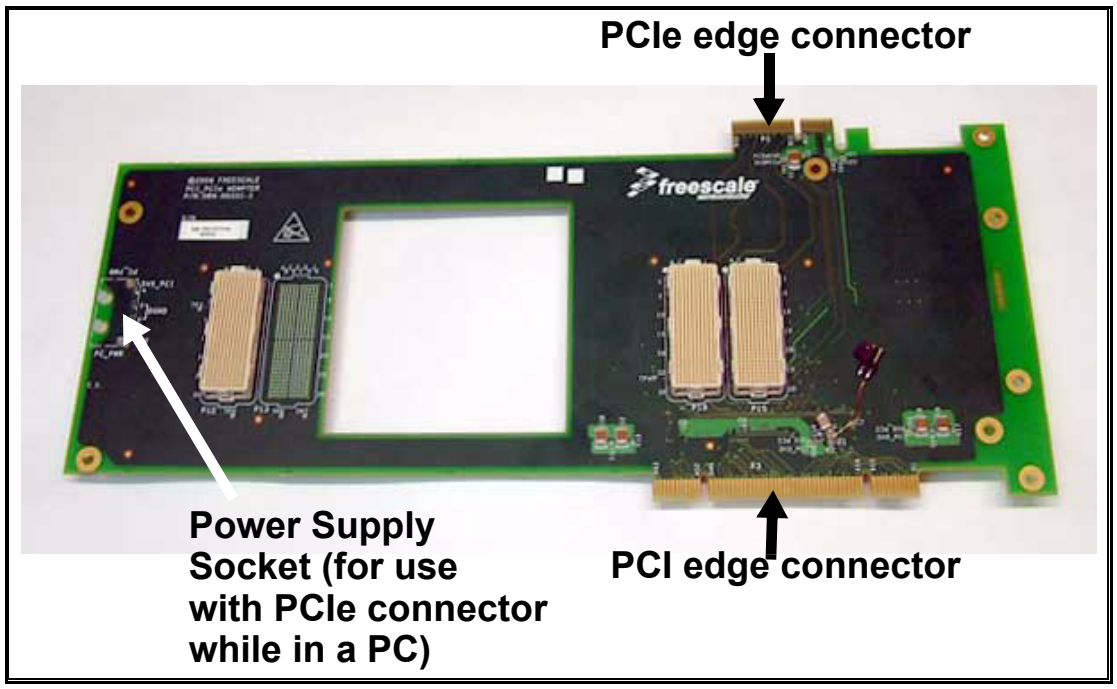


Figure 2-16. PCI_PCIe adaptor

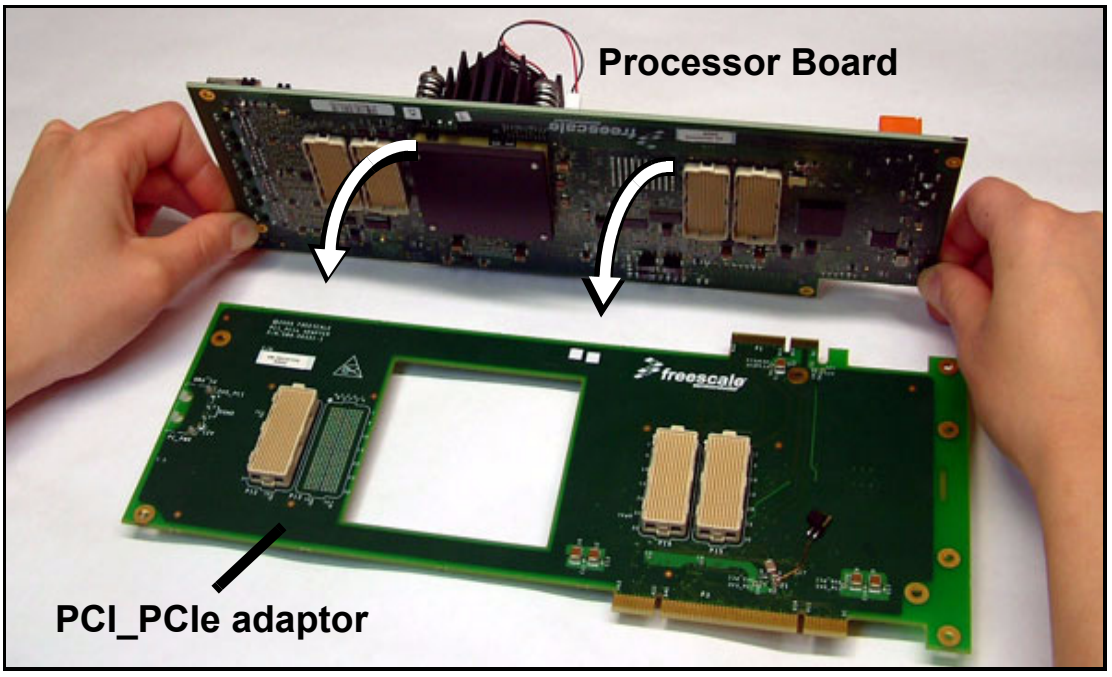


Figure 2-17. Fastening the PCI_PCIe adaptor to the MPC8568E MDS Processor Board

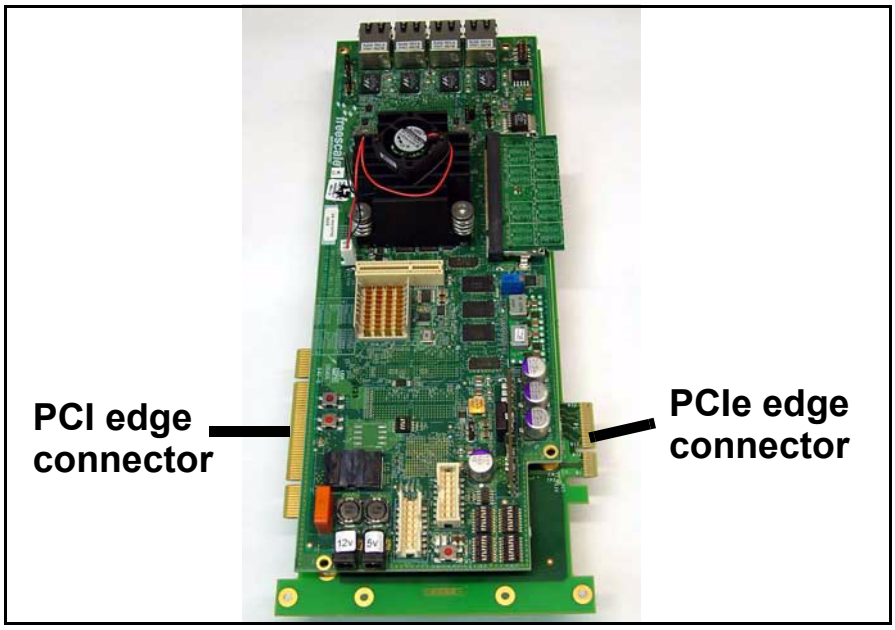


Figure 2-18. PCI adaptor attached to MPC8568E MDS Processor Board

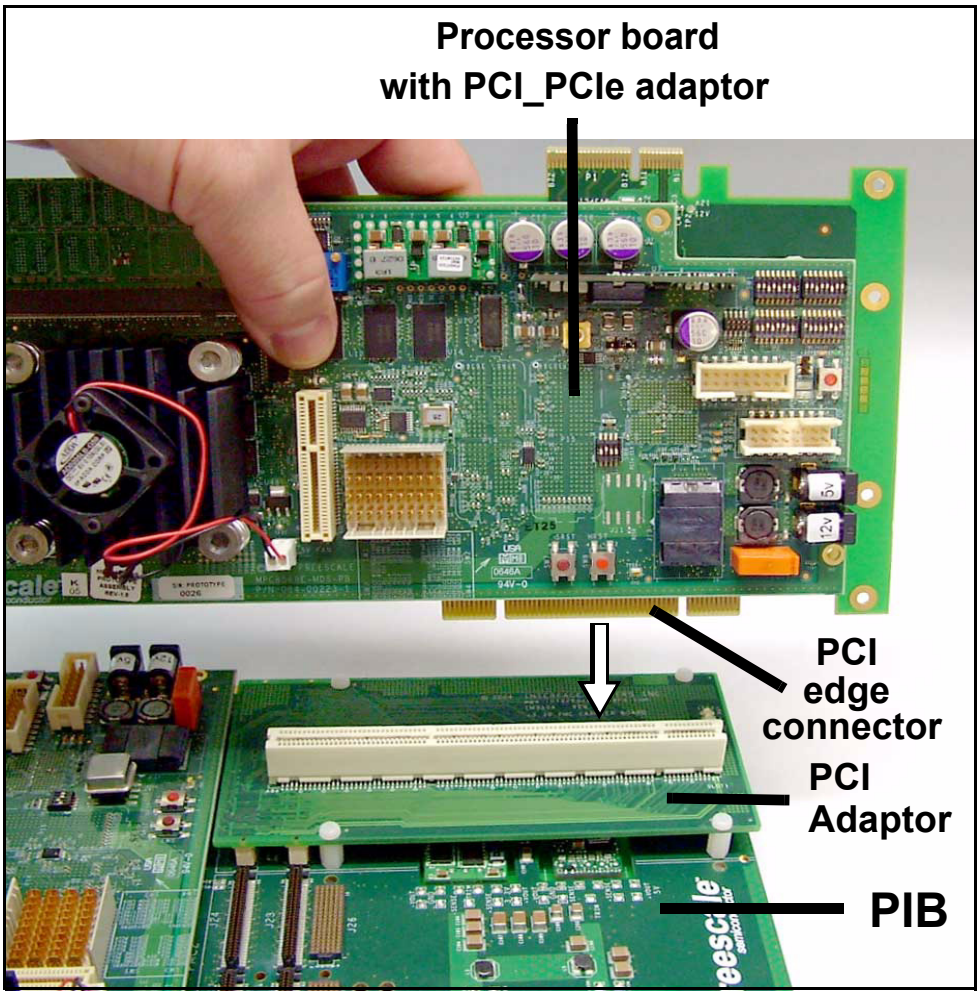


Figure 2-19. Inserting processor board into a PCI adaptor on the PIB

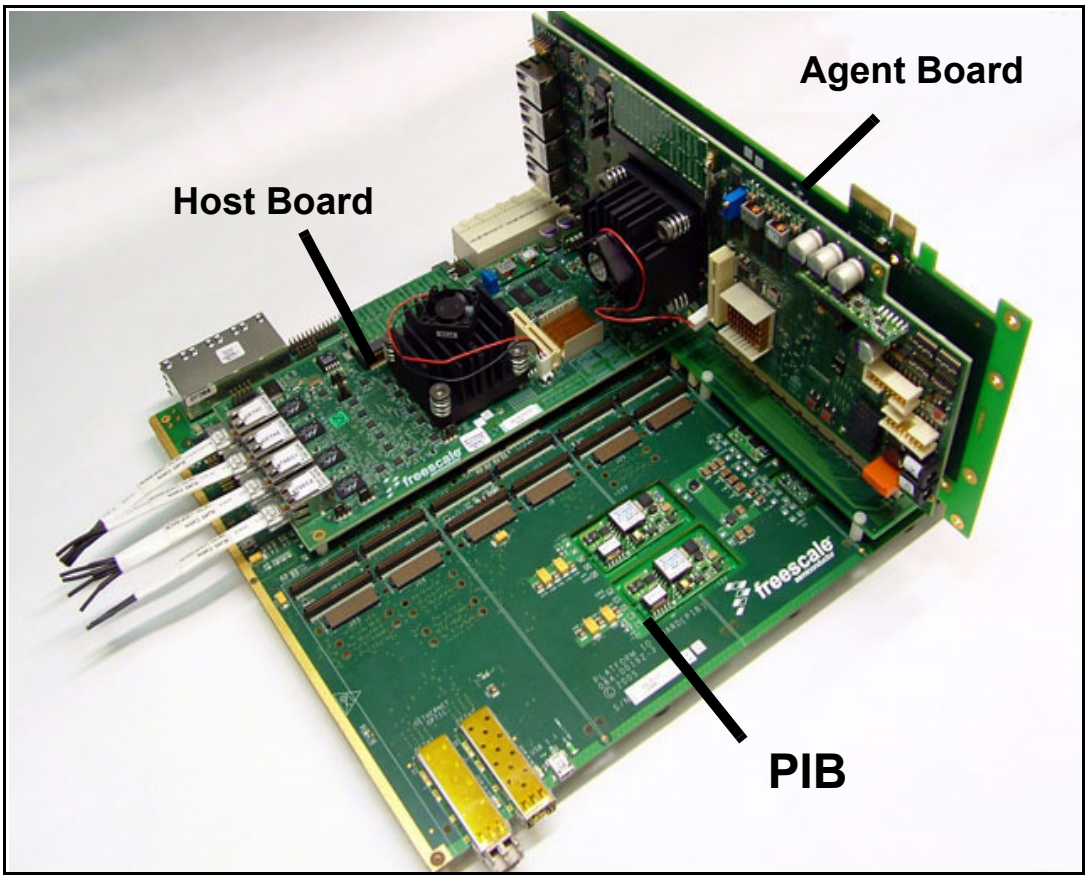


Figure 2-20. An MPC8568E MDS Processor Board as an agent on the PIB, with an additional MPC8568E MDS Processor Board as host

2.2.3 For PCI-express

An MPC8568E MDS Processor Board can function as a host of an additional PCIe agent module. This agent module can be either a third-party device, or an MPC8568E MDS Processor Board, functioning as a PCIe agent. Note that the PIB is not required in this case.

1. Ensure that the host board is configured as a host, which is its default configuration (see *SW2 Configuration* on page 4-3 for more information). See Figure 2-21 on page 2-14 for locations of the PCIe and sRIO sockets on the processor board.
2. Insert the edge connector of the PCIe module into the PCIe socket on the host board as shown in Figure 2-22 on page 2-15. It may be necessary to remove the front panel of certain PCIe modules to ensure a proper fit.

CAUTION

Make sure that the PCIe module is inserted in the direction shown in Figure 2-22 (below). Inserting it in the wrong direction can cause damage to the PCIe module, or to the MPC8568E MDS Processor Board.

3. If the PCIe agent module requires a 12V power supply, connect a 12V power supply to the host MPC8568E MDS Processor Board's 12V power jack (see Figure 2-21 (below)). LD15 being lit (on the host board) indicates that this power input is active.

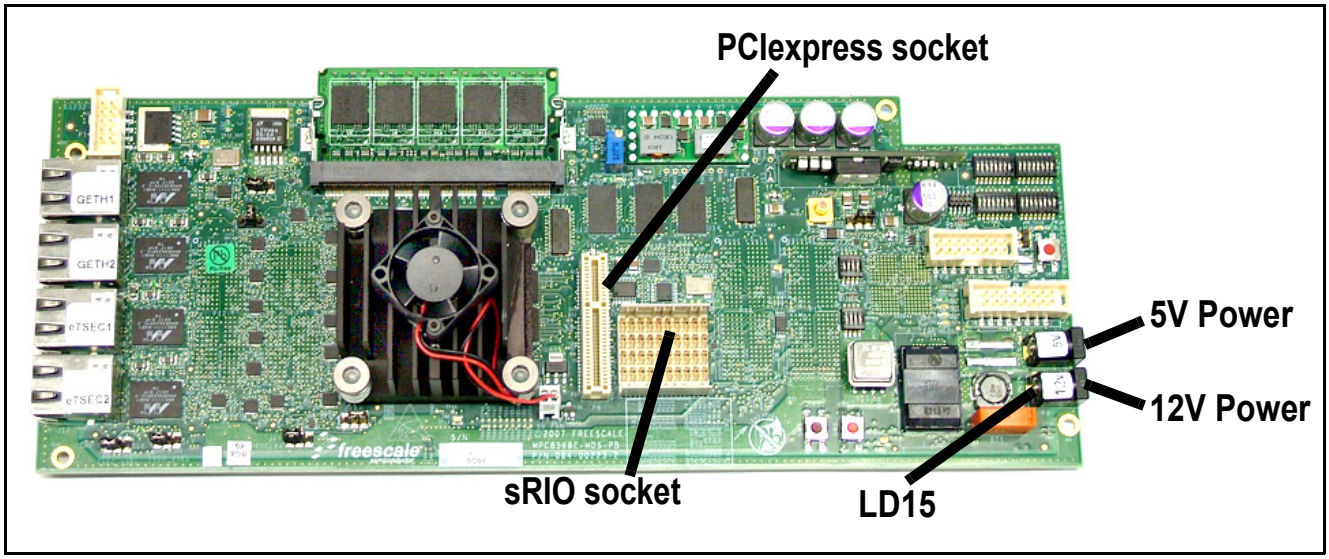


Figure 2-21. Processor board showing PCIe and sRIO sockets

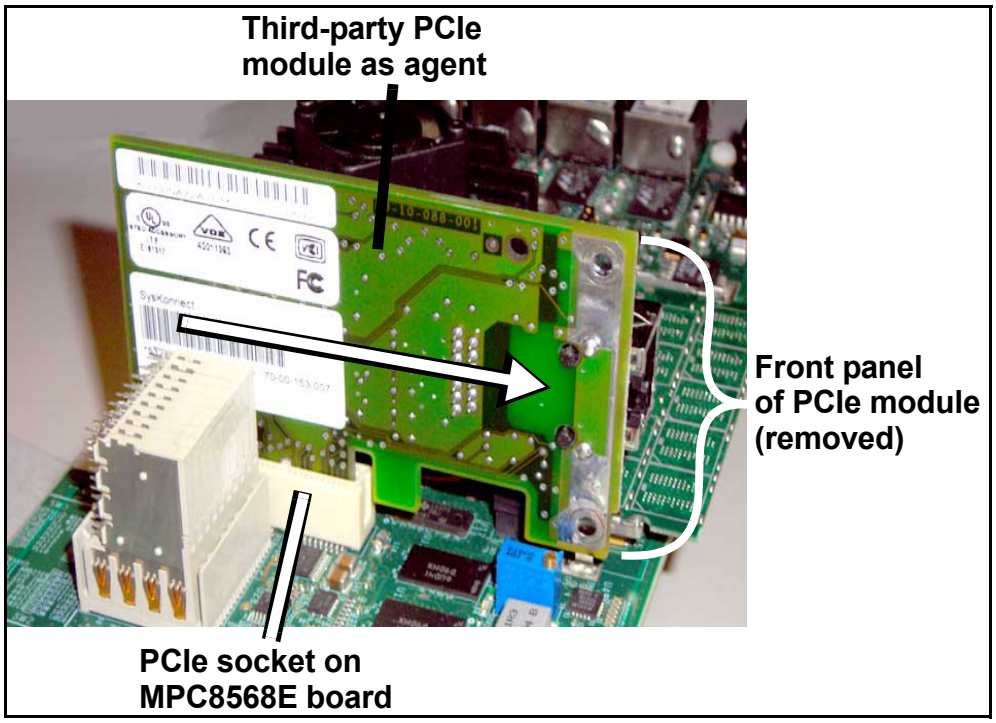


Figure 2-22. PCIe agent properly inserted in PCIe socket on MPC8568E MDS Processor Board

4. If working with a MPC8568E MDS Processor Board as a PCIe agent, do the following steps:
   a) Configure the agent board as follows: set SW2.4-SW2.6 to '010' (see *SW2 Configuration* on page 4-3 for more information).
   b) Fasten the PCI_PCIe adaptor to the underside of the MPC8568E MDS Processor Board, as shown in Figure 2-17 on page 2-11 and Figure 2-18 on page 2-11.
   c) Fasten the support extender to the far end of the PCI_PCIe adaptor, as shown in Figure 2-23 on page 2-16. This provides mechanical support for the PCIe agent board. The longer support extender should be used if the host board will also be fastened on the PIB (see Figure 2-27 on page 2-18) at the same time as being a PCIe host.
   d) Using the PCI_PCIe adaptor's PCIe edge connector, insert the agent Processor Board into a host Processor Board, as shown in Figure 2-25 on page 2-16. Figure 2-26 on page 2-17 shows two boards connected. Figure 2-27 on page 2-18 shows two boards connected while the host board is on the PIB.
   e) You can, at the same time, connect an sRIO cable between the boards (see Figure 2-28 on page 2-19 and Figure 2-29 on page 2-20 for an illustration of connecting two boards via an sRIO cable). To do this at the same time as the PCIe, set SW2.4-SW2.6 to '000' on the agent board, thus configuring it to act as an agent (endpoint) of both a PCI Express and a serial RapidIO (sRIO) host. Reset the board for this setting to take affect.
   f) Make sure that both boards have their own power supply, connected to their respective 5V inputs.

5. Connect external cables in accordance with your development needs.
6. Reset the host board, and verify that the power-on-reset sequence is carried out properly: LD1 briefly displays light, afterwhich LD2 and LD7 are constantly lit. (see Figure 2-3 on page 2-2 for location). They should be on for only a few moments. This indicates that the board has successfully completed the boot-up sequence.
7. Continue operation according to instructions in the *Kit Configuration Guide*.

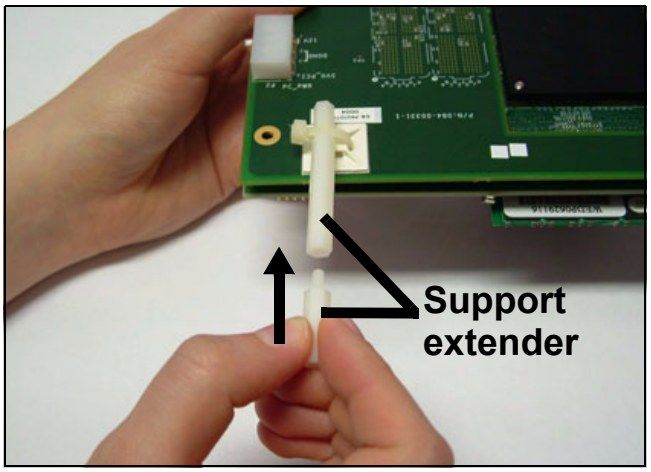


Figure 2-23. Fastening the support extender

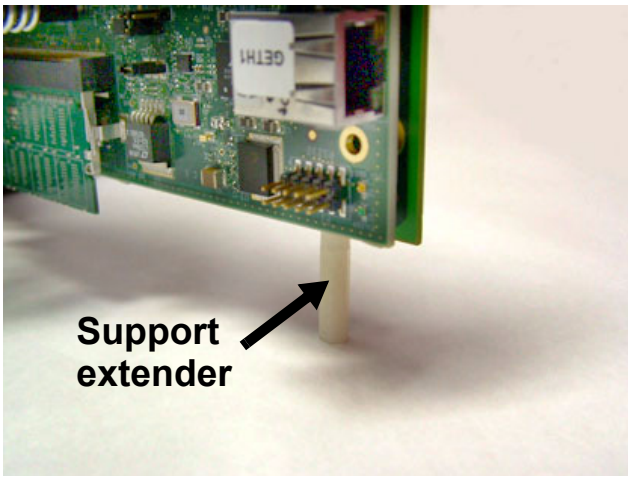


Figure 2-24. Support extender fastened to PCI_PCIe adaptor

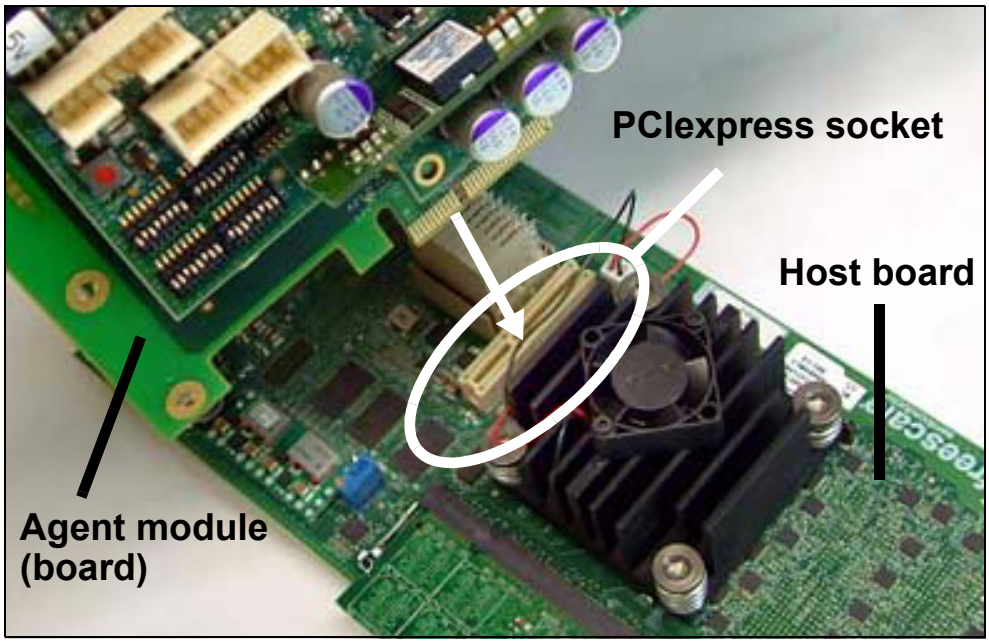


Figure 2-25. Connecting a PCIexpress agent module to the MPC8568E MDS Processor Board

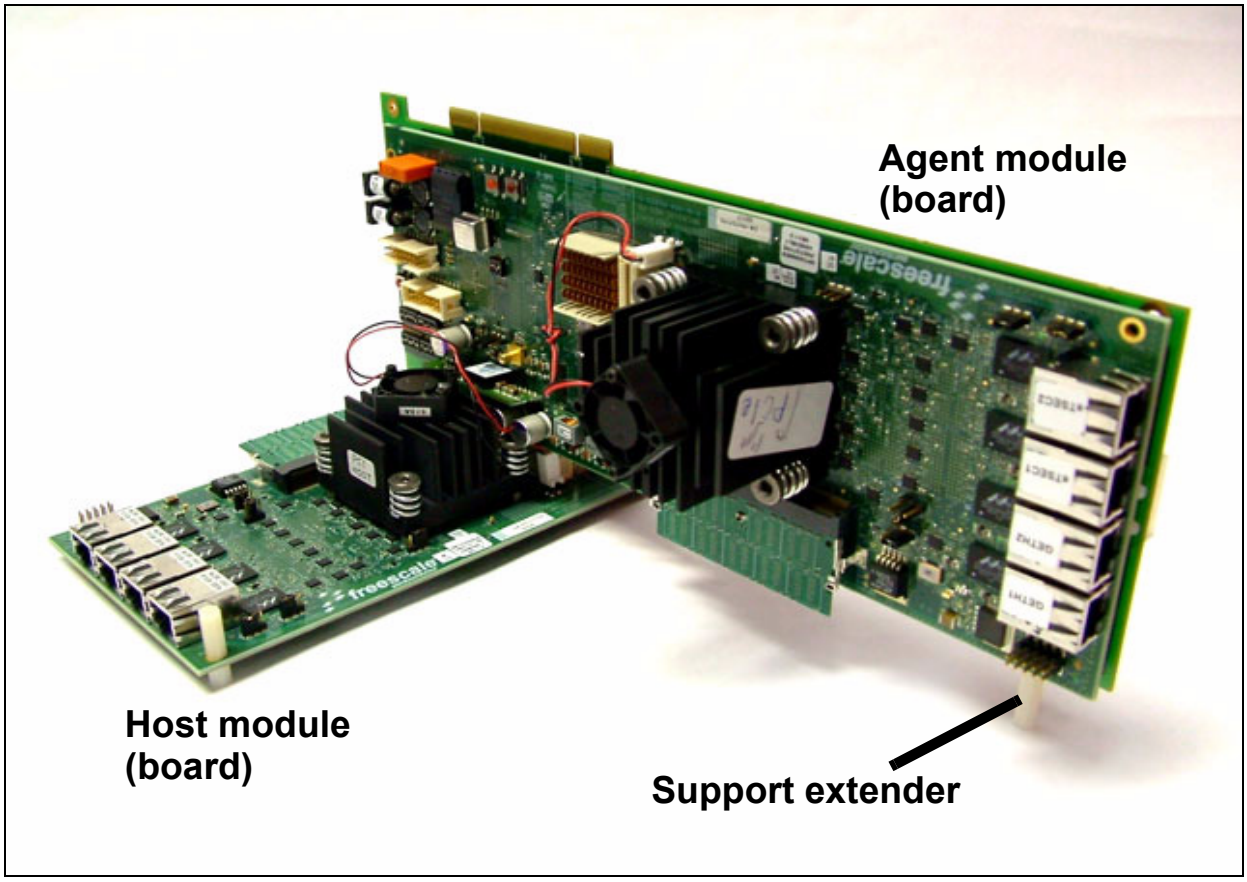


Figure 2-26. Two boards connected via the PCIe socket (note support extender)

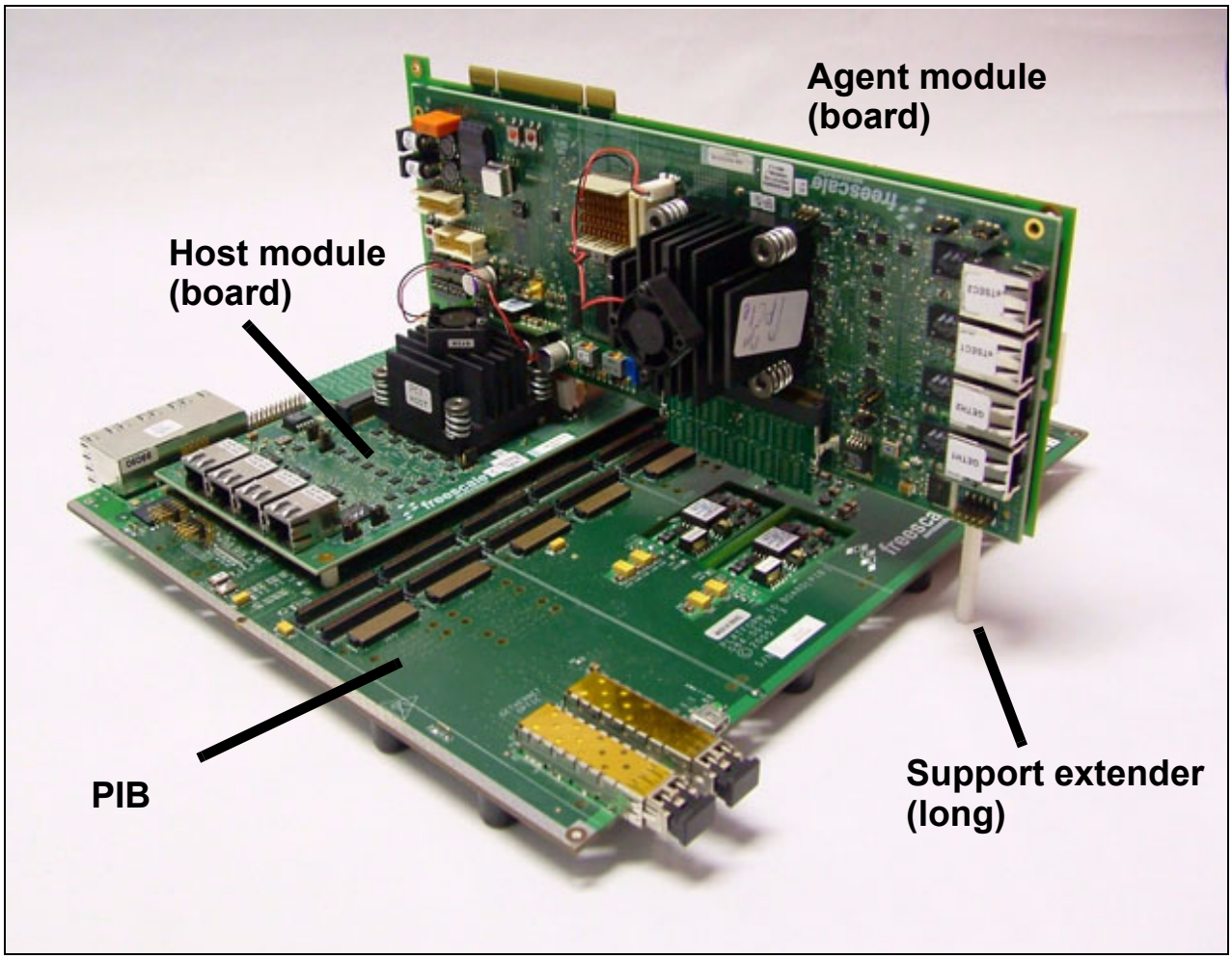


Figure 2-27. Processor Board, as PCIe agent on Host Processor Board, when the Host is on the PIB

2.2.4 For sRIO

An MPC8568E MDS Processor Board can function as an sRIO host (or "root complex") of an additional MPC8568E MDS Processor Board, functioning as an sRIO agent (or "endpoint"). Note that the PIB is not required in this case.

1. Ensure that the host board is configured as a host, which is its default configuration (see *SW2 Configuration* on page 4-3 for more information). See Figure 2-21 on page 2-14 for locations of the PCIe and sRIO sockets on the processor board.
2. Configure the agent (or "endpoint") board as follows: set SW2.4-SW2.6 to 'x01' (see *SW2 Configuration* on page 4-3 for more information).
3. Connect the sRIO cable to the host (or "root complex") board (see Figure 2-28 on page 2-19), then to the agent (or "endpoint") board (see Figure 2-29 on page 2-20 for an illustration of two boards connected via an sRIO cable).

4. You can, at the same time, connect the sRIO agent (endpoint) board as a PCIe agent as well (to the same host board). To do this, set SW2.4-SW2.6 to ‘000’ on the agent board, thus configuring it to act as an agent (endpoint) of both a PCI Express and a serial RapidIO (sRIO) host, and follow further instructions in Section Section 2.2.3 on page 2-13to make the PCIe connection.
5. Connect a power supply to the 5V input on the agent board (both boards require their own independent power supply).
6. Operate *Code Warrior*® via the host board to verify that the installation was done properly. For more information on *Code Warrior*®, see the *Kit Configuration Guide*.
7. Connect external cables in accordance with your development needs.
8. Reset the agent board, and verify that the power-on-reset sequence is carried out properly: LD1 briefly displays light, afterwhich LD2 and LD7 are constantly lit. (see Figure 2-3 for location). They should be on for only a few moments. This indicates that the board has successfully completed the boot-up sequence.
9. Continue operation according to instructions in the *Kit Configuration Guide*.

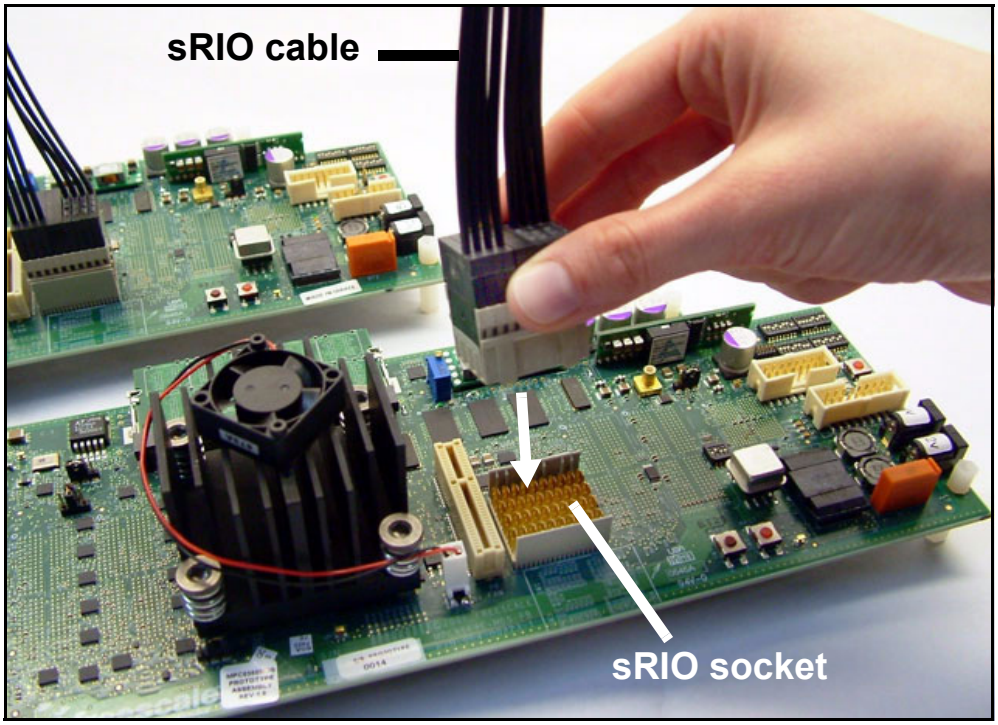


Figure 2-28. Connecting an sRIO agent module to the MPC8568E MDS Processor Board

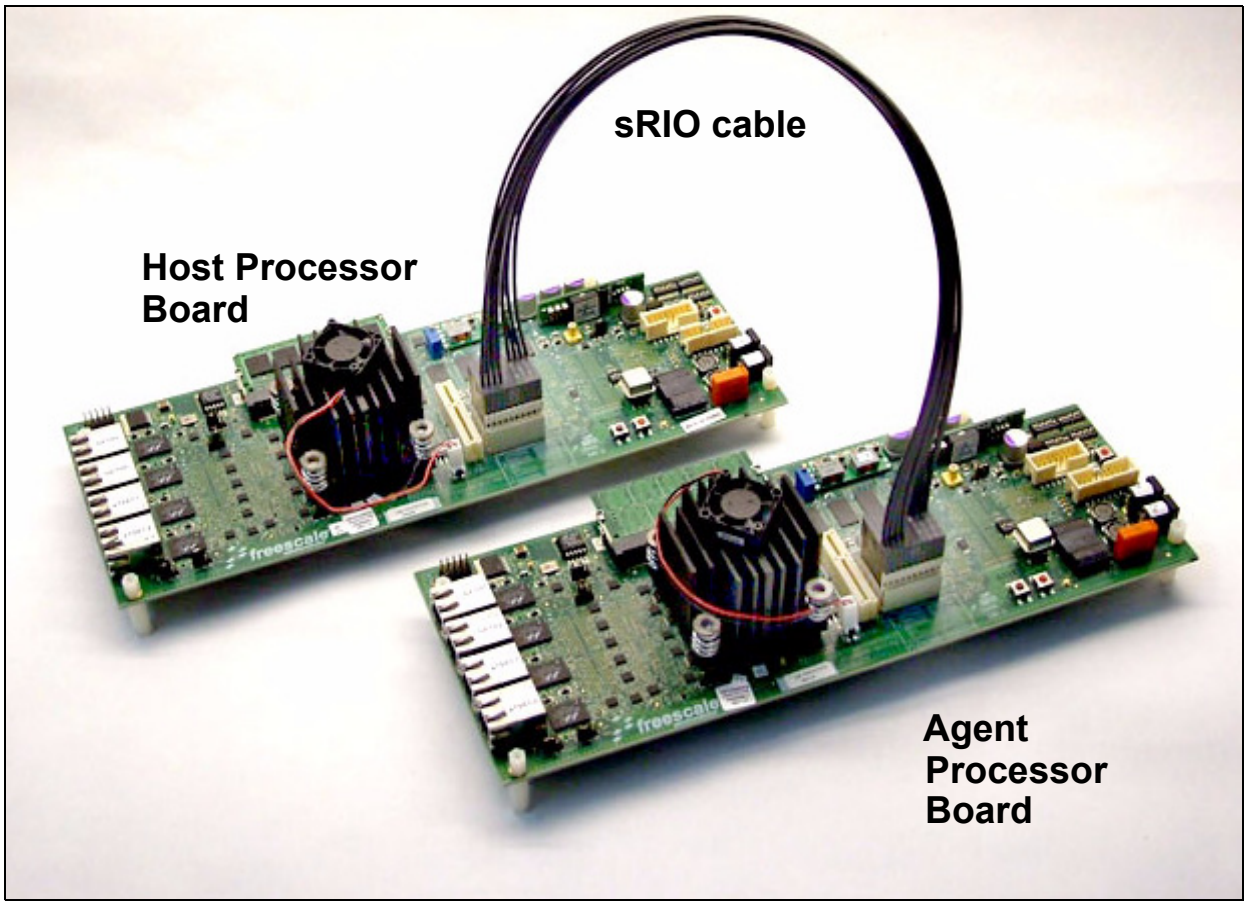


Figure 2-29. Two processor boards conneted via the sRIO cable

2.2.5 In a PC

An MPC8568E MDS Processor Board can function as a PCI or PCIe agent, installed in a PC. In this case, power is supplied by the PC[1], and JTAG connections are carried out via the PCI or PCIe connection.

1. Configure the agent board as follows: set SW2.4-SW2.6 to '110' (see *SW2 Configuration* on page 4-3 for more information).
2. Fasten the PCI_PCIe adaptor to the underside of the MPC8568E MDS Processor Board, as shown in Figure 2-17 and Figure 2-18 on page 2-11.
3. Using the PCI_PCIe adaptor's PCI edge connector, insert the Processor Board into a PC.
4. Alternatively, you can use the PCI_PCIe adaptor's PCIe edge connector, but in this case you must configure SW2.4-SW2.6 to '010', and you must connect the power socket on the PCI_PCIe adaptor (see Figure 2-30) to the PC's power supply.
5. Connect external cables to the agent board in accordance with your development needs.
6. Reset the agent board for all settings to take affect.

1. If using the PCIe edge connector, a power cable must be connected to the PCI_PCIe adaptor's power socket.

7. Operate *Code Warrior*® via the PC to verify that the installation was done properly. For more information on *Code Warrior*®, see the *Kit Configuration Guide*.

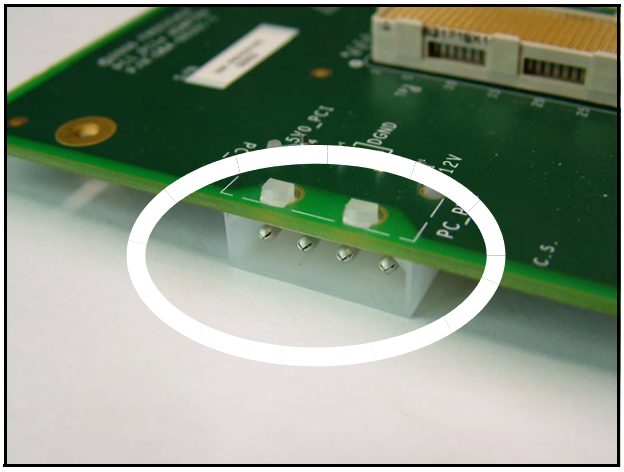


Figure 2-30. PCI_PCIe adaptor: power supply socket

Chapter 3
Memory Map

3.1 MPC8568E MDS Processor Board Mapping

The MPC8568E Memory Controller governs all access to the processor memory slaves. Consequently the memory map may be reprogrammed according to user needs. The memory map defined in Table 3-1 is only a recommendation. The user can choose to work with alternative memory mapping. It should be noted that the described mode is supported by the *Code Warrior*® debug tool.

After performing Hard Reset, the debug host may initialize the memory controller via the JTAG/COP connector so this allows additional access to bus addressable peripherals. The DDR2, SDRAM and FLASH memory respond to all types of memory access - program/data and Direct Memory Access (DMA).

Table 3-1. MPC8568-MDS-PB Memory Map with NOR Flash as boot source

ADDRESS RANGE	Memory Type	Device Name		Port Size
00000000 - 1FFFFFFF	DDR2	WV3HG64M72EEU534P D4-M by White Electronic Designs (512 MByte)	WV3HG2128M72EEU806 AD4-xG by White Electronic Designs (2GByte)	64+8 ECC
20000000 - 7FFFFFFF				
80000000 - 9FFFFFFF	PCI	Inbound/Outbound Window (512 MByte)		32
A0000000 - BFFFFFFF	PCIe	Inbound/Outbound Window (512 MByte)		x4 lane
C0000000 - DFFFFFFF	SRIO	Inbound/Outbound Window (512 MByte)		x4 lane
E0000000 - E01FFFFF	MPC8568 Internal Map	Internal Memory Register Space (2 MByte)		32
E0200000 - E03FFFFF	Reserved	For Future derivatives of MPC8568 (2 MByte)		-
E0400000 - E047FFFF	L2-SRAM	L2 - Cash (512 KByte)		
E0480000 - EFFFFFFF	Empty Space			-
F0000000 - F3FFFFFF	SDRAM on CS2	MT48LC16M16A2BG by Micron (64 MByte)		32+4 Parity
F4000000 - F7FFFFFF	Empty Space			-
F8000000 - F8007FFF	BCSR on CS1	Altera (32 KByte)		8
F8008000 - F800FFFF	CS4	PIB		8
F8010000 - F8017FFF	CS5	PIB		8
FE000000 - FFFFFFFF	Nor Flash on CS0	S29GL256N11TFIV2O by Spansion (32 MByte)		16

Chapter 4
Controls and Indicators

This chapter describes controls and indicators of the MPC8568E MDS Processor Board, which includes switches, jumpers, LEDs, and push buttons.

4.1 DIP Switches

Figure 4-1 below shows the locations of the DIP Switches. Note that when “ON”, the value of the switch is zero.

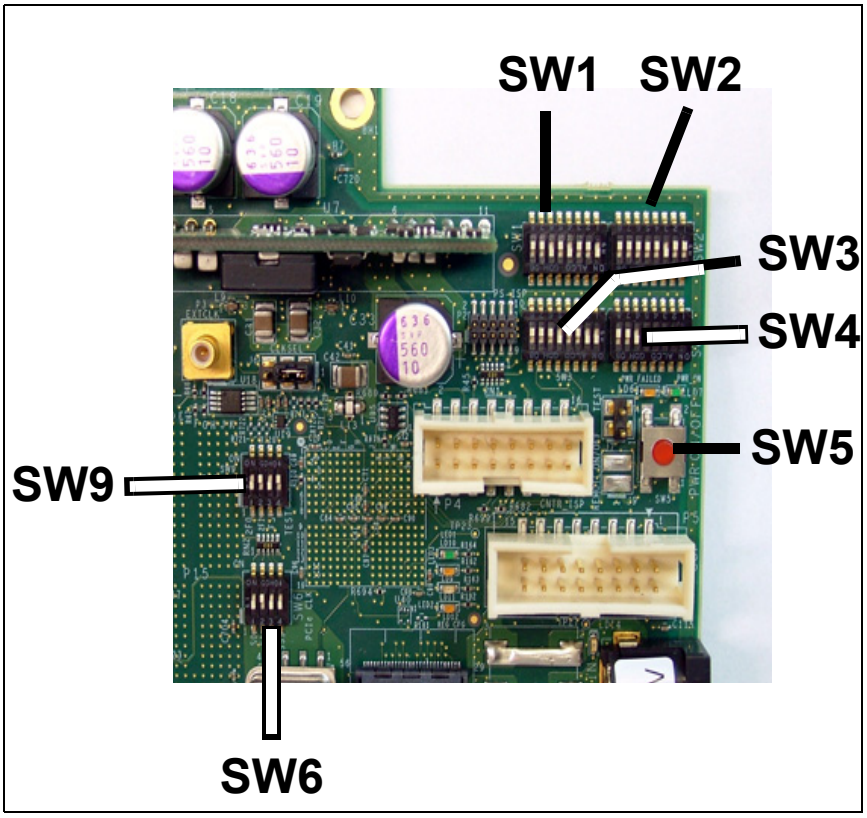
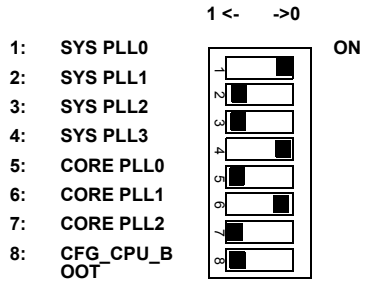


Figure 4-1. MPC8568E MDS Processor Board Switches Locations

Descriptions of settings for the DIP switches are described below:

SW1 Configuration



The "On" DIP Switch position corresponds to a signal value of “zero”.

SW1.1-SW1.4: SYS_PLL[0:3]

Sets the ratio by which to multiply SYSCLOCK to give the platform frequency (CCB = SYSCLOCK * SYS_PLL[0:3])

factory setting: '0110' = 400Mhz. (ratio of 6:1)

‘0000’ - 16:1
‘0010’ - 2:1
‘0011’ - 3:1
‘0100’ - 4:1
‘0101’ - 5:1
‘1000’ - 8:1
‘1001’ - 9:1
‘1010’ - 10:1
‘1100’ - 12:1
‘1101’ - 20:1
All other values reserved

SW1.5 - SW1.7: CORE PLL[0:2]

Sets the ratio by which to multiply CCB to give the e500 core frequency (e500 Core = CCB * CORE PLL[0:2])

factory setting: '101' = 1066Mhz (ratio of 2.5:1)

‘000’ - 4:1
‘001’ - 4.5:1
‘010’ - 1:1
‘011’ - 1.5:1
‘100’ - 2:1
‘110’ - 3:1
‘111’ - 3.5: 1

SW1.8 CFG_CPU_BOOT

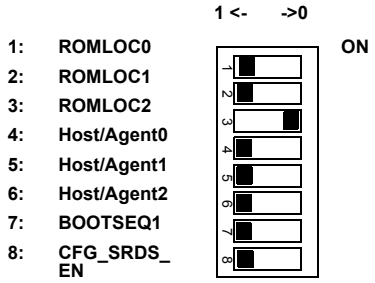
Enables/Disables the e500 core to boot without waiting for configuration by an external host

factory setting: '1' = The e500 core may boot without waiting for configuration by an external master

‘0’ - CPU boot holdoff mode. The e500 core is prevented from booting until configured by an external master

Default setting: 01101011

SW2 Configuration



SW2.1-SW2.3: ROMLOC[0:2]

Selects the Boot ROM location from one of the following locations: PCI, DDR, SRIO,PCIe, Local bus

factory setting: '110'; Boot from Local Bus GPCM 16bit (Flash ROM)

‘000’ - PCI
‘001’ - DDR SDRAM
‘010’ - Reserved
‘011’ - Serial RapidIO (SRIO)
‘100’ - PCI Express (PCIe)
‘101’ - Local bus GPCM 8bit (Flash ROM)
‘111’ - Local bus GPCM 32bit (Flash ROM)

SW2.4-SW2.6: Host Agent PCI,PCIe,SRIO selection. [0:2]

Configures how the MPC8568E is to work: host, or agent (PCI, PCIe, or SRIO device)

factory setting: '111'; MPC8568 acts as the host processor/root complex.

‘000’ - MPC8568E acts as an agent (endpoint) of both a PCI Express and a serial RapidIO host.
‘x01’ - MPC8568E acts as an agent of a serial RapidIO host.
‘010’ - MPC8568E acts as an agent of a PCI Express host
‘011’ - Reserved
‘100’ - MPC8568E acts as an agent of both a PCI and a serial RapidIO host
‘110’ - MPC8568E acts as an agent of a PCI host.

SW2.7 Boot Sequencer

Determines if I^2C addressing mode is used, thereby enabling the boot sequencer.

factory setting: ‘1’ - Boot sequencer is disabled. No I^2C ROM is accessed.

‘0’ - Extended I^2C addressing mode is used. Boot sequencer is enabled and loads configuration information from a ROM on the I^2C1 interface. A valid ROM must be present.

SW2.8: CFG_SRDS_EN

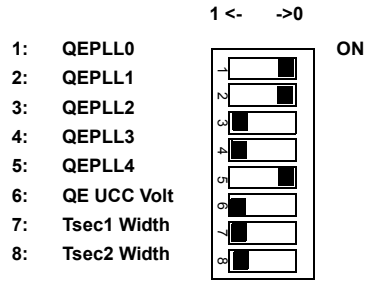
Enables/disables the SerDes interface

factory setting: '1'; SerDes interface enabled

‘0’ - SerDes interface is disabled. When it is disabled, the Serial RapidIO and PCI Express controllers are also disabled

Default setting: 11011111

SW3 Configuration



SW3.1-SW3.5: QE PLL [0:4]

Sets the ratio by which to multiply SYSCLK to give the QECLK value (QECLK = SYSCLK * QE_PLL[0:4])

factory setting: '0_0110' = 400Mhz (ratio of 6:1)

Other possible values:

0_0000 - 16:1	0_1100 - 12:1	1_0111 - 23:1
0_0001 - Reserved	0_1101 - 13:1	1_1000 - 24:1
0_0010 - 2:1	0_1110 - 14:1	1_1001 - 25:1
0_0011 - 3:1	0_1111 - 15:1	1_1010 - 26:1
0_0100 - 4:1	1_0000 - 16:1	1_1011 - 27:1
0_0101 - 5:1	1_0001 - 17:1	1_1100 - 28:1
0_0111 - 7:1	1_0010 - 18:1	1_1101 - 29:1
0_1000 - 8:1	1_0011 - 19:1	1_1110 - 30:1
0_1001 - 9:1	1_0100 - 20:1	1_1111 - 31:1
0_1010 - 10:1	1_0101 - 21:1	
0_1011 - 11:1	1_0110 - 22:1	

SW3.6: QE UCC Voltage

Sets the voltage of UCC when it works with GETH

factory setting: '1' - Voltage of UCC (when working with GETH) = 3.3V

'0' - UCC Voltage = 2.5V

SW3.7: Tsec1 Width

Sets the eTSEC1 width

factory setting: '1' - eTSEC1 Ethernet interface operates in standard width TBI, GMII, MII. Or if in FIFO mode, it operates as a 16-bit FIFO.

'0' - eTSEC1 Ethernet interface operates in reduced pin mode, either RTBI, RGMII, RMII, or in 8-bit FIFO mode.

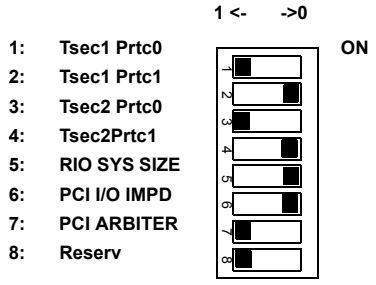
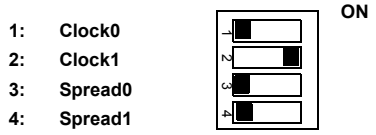
SW3.8: Tsec2 Width

Sets the eTSEC2 width

factory setting '1' - eTSEC2 Ethernet interface operates in standard width TBI, GMII, MII, or 8-bit FIFO mode.

'0' - eTSEC2 Ethernet interface operates in reduced mode, either RTBI, RGMII or RMII.

Default setting: 00110111

SW4 Configuration  1 <- ->0 ON 1: Tsec1 Prtc0 2: Tsec1 Prtc1 3: Tsec2 Prtc0 4: Tsec2Prtc1 5: RIO SYS SIZE 6: PCI I/O IMPD 7: PCI ARBITER 8: Reserv	**SW4.1: SW4.2 Tsec1_Prtc[0:1].** Selects the eTSEC1 protocol: MII, GMII, TBI, or FIFO ***factory setting: '10' (GMII, or RGMII if configured in reduced mode)*** '00' - Uses 16-bit FIFO protocol (or 8-bit FIFO protocol if configured in reduced mode) '01' - Uses the MII protocol (or RMII if configured in reduced mode) '11' - Uses the TBI protocol (or RTBI if configured in reduced mode) **SW4.3: SW4.4 Tsec2_Prtc[0:1].** Selects the eTSEC2 protocol: MII, GMII, TBI, or FIFO ***factory setting: '10' (GMII, or RGMII if configured in reduced mode)*** '00' - Uses 8-bit FIFO protocol '01' - Uses the MII protocol (or RMII if configured in reduced mode) '11' - Uses the TBI protocol (or RTBI if configured in reduced mode) **SW4.5: RIO SYS SIZE** Selects system size ***factory setting: '0'; Small system size up to 256 devices.*** '1' - Large system size (up to 65,536 devices) **SW4.6 PCI I/O Impedance:** ***factory setting: '0'; 25 Ohm I/O impedance.*** '1' - 42 Ohm I/O impedance **SW4.7 : PCI Arbiter.** ***factory setting: '1'; The on chip PCI arbiter is enabled.*** '0' - On-chip PCI arbiter is disabled. External arbitration is required. **SW4.8 : Reserved.** ***factory setting: '1'; Reserved*** Default setting: 10100011
SW6 Configuration  1 <- ->0 ON 1: Clock0 2: Clock1 3: Spread0 4: Spread1	**SW6.1: SW6.2 PCI Express/sRIO Clock[0:1].** Sets the clock value. ***factory setting: '10' = 100MHz*** '00' - 25MHz '01' - 125MHz '11' - 200MHz **SW6.3: SW6.4 PCI Express/sRIO Clock Spread[0:1].** Sets the spread value. ***factory setting: '11' = No spread*** '00' - Center +/- 0.25 '01' - Down - 0.75 '10' - Down - 0.5 Default setting: 1011

SW9 Configuration 1 <- ->0 1: 2F0 2: 2F1 3: FS 4: Test ON	**SW9.1: SW9.2 Skew Control [0:1].** Sets the skew of the PCI clock. ***factory setting: '11' = No skew.*** Use this setting on host board if using any PCI agent *except* the MPC8568E board '00' - (-4Tu) (Tu = time unit = 0.95ns) '10' - (-3Tu) use this setting on host board if using an MPC8568E board as agent '01' - (-1Tu) **SW9.3: PLL Frequency range.** Sets the PLL frequency range. ***factory setting: '1' = 48MHz - 100MHz*** '0' - 24MHz - 50MHz **SW9.4: Test.** Disables output if skew = -4Tu (Tu = "time unit" = 0.95ns). ***factory setting: '0' = disable output if skew = -4Tu*** '1' - Do not disable output, even if skew = -4Tu *This switch provides a digitally controlled delay of the PCI_CLK signal in order to provide stable operation of the board when it is a PCI agent* Default setting: 1110
SW5 Power Switch ON PCB	**SW5: power switch (toggle)** • power from an external 5V power supply via the P10 power jack • combined mode: powered from +5V on PIB power supply through riser connectors • board plugged as a PCI or PCIe add-in card: PC or host board internal power supply will provide 5V via PCI/PCIe edge connector

4.2 Jumpers

Figure 4-2 below shows the locations of the jumpers.

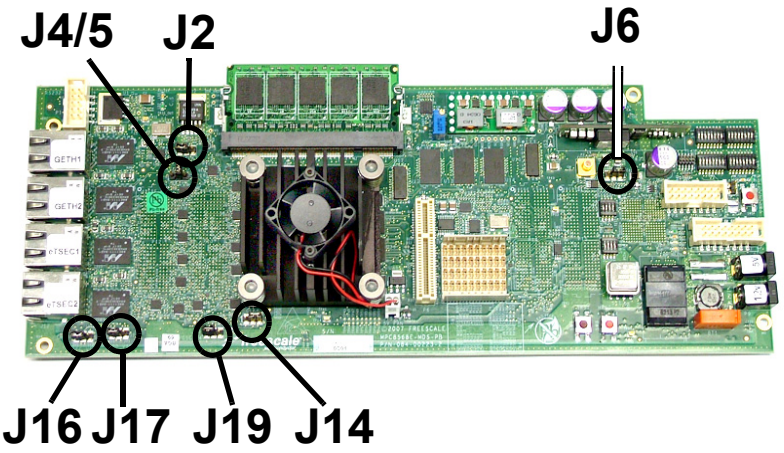


Figure 4-2. MPC8568E MDS Processor Board Jumpers Locations

Descriptions of settings for the Jumpers are described below:

Table 4-1. Jumper Settings

J2: 3 TDMC-RXCLK 2 PD22 (CLK7) 1 UPC2-RXCLKIN	Selects input for CLK7: TDMC_RXCLK or UPC2_RXCLKIN • For UPC2-RXCLKIN: Connect 1-2 (default) • For TDMC-RXCLK: Connect 3-2
J4 & J5: J5 3 RMII_RXCLKODD PB31(CLK16) 2 GE125 J4 1 XUPC1_TXCLKO	Selects input for CLK16: RMII_RXCLKODD, GE125, or XUPC1_TXCLKO (J5/J4 is a 4-pin combined Jumper, configured as shown at left) • For RMII_RXCLKODD: Connect (JP5) 2-3 • For XUPC1_TXCLKO: Connect (JP5) 1-2 • For GE125: Connect JP4 (default) Note: GE125 is the input clock for UCC1 & UCC1 input 125Mhz clock.
J6: 3 External clock 2 Input MPC8568 clock 1 OnBoard clock	Selects input clock for MPC8568E (onboard or external) • For external clock: Connect 2-3 • For internal clock: Connect 1-2 (default)
J14: 3 RMII_RXCLKEVEN 2 PD23 (CLK8) 1 UPC2_TXCLK	Selects input for CLK8: RMII_RXCLKEVEN or UPC2_TXCLK • For RMII_RXCLKEVEN: Connect 2-3 (default) • For UPC2_TXCLK: Connect 1 - 2.
J16: 3 3.3V 2 TSEC VDD 1 2.5V	Selects input voltage for TSEC_VDD (3.3V or 2.5V) • For 3.3V: Connect 2-3 • For 2.5V: Connect 1-2 (default)
J17: 3 3.3V 2 QE UCC1&2 VDD 1 2.5V	Selects input power for QE UCC1&2 (MPC8568 QE GETH block) - 3.3V or 2.5V • For 3.3V: Connect 2-3 • For 2.5V: Connect 1-2 (default)
J19: 3 MAC_HW-CP-G-T-SO5 2 XUPC2_RXD9_PCICLK4 1 XPCI_CLK4	Enables PCI clock to be routed to expansion board of the PIB • For normal operation (no re-routing of PCI clock): Connect 1-2 (default) • To route PCI clock to expansion board: Connect 2-3

4.3 LEDs

Figure 4-3 below shows the locations of the LEDs.

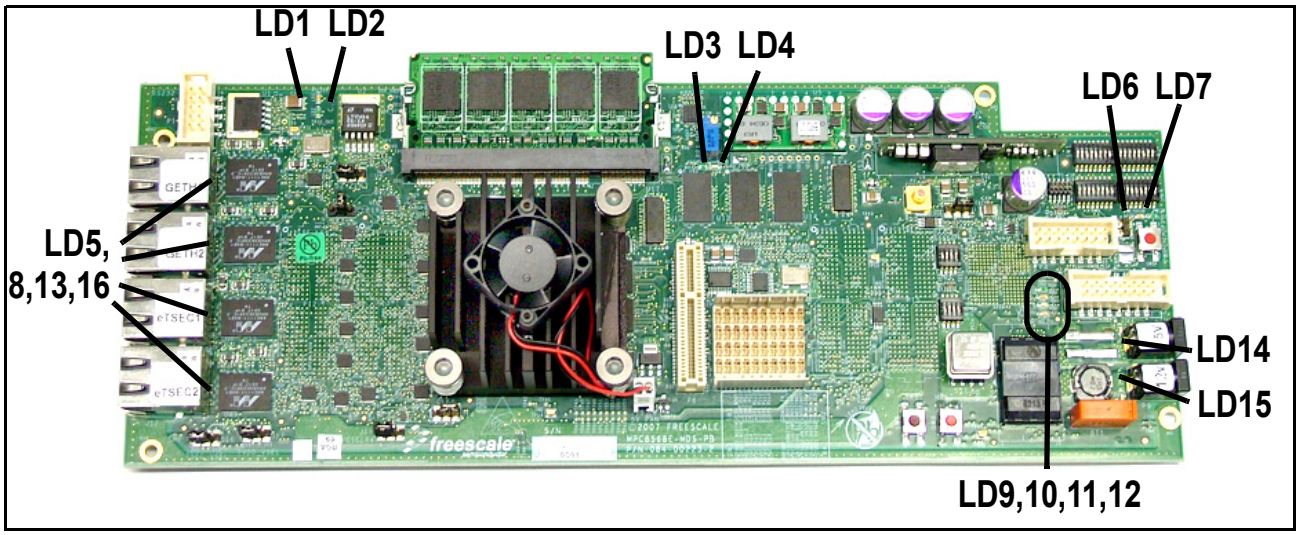


Figure 4-3. MPC8568E MDS Processor Board LEDs Locations

Descriptions of LED indicator meanings are described below:

No.	Name	Color	LED On	LED Off
LD1	ASLEEP	Green	Device in PORESET or in sleep state	Device not in PORESET or sleep state
LD2	TRIG_OUT	Red	Device ready after PORESET	Device not ready
LD3	DDR2	Green	Power supplied to DDR2	No power supplied to DDR2
LD4	DDR1	Green	Power supplied to DDR1	No power supplied to DDR1
LD5	UCC1	Green	GETH connected to UCC1 active	GETH not active
LD6	Power Fail	Red	Power is not properly supplied to device	If board is active, power is properly supplied to device
LD7	Power On	Green	Board power is ON	Board power is OFF
LD8	UCC2	Green	GETH connected to UCC2 active	GETH not active
LD9	BCSR	Red	Connected to BCSR5 for debugging purposes	
LD10	BCSR	Green		
LD11	BCSR	Amber		
LD12	REG-CFG	Red	Configuration from internal registers	Configuration from DIP switches
LD13	eTSEC3	Green	GETH connected to TSEC1 active	GETH not active
LD14	Power 5V	Amber	5V input active	5V input not active
LD15	Power 12V	Green	12V input active	12V input not active
LD16	eTSEC4	Green	GETH connected to TSEC2 active	GETH not active

4.4 Other Controls and Indicators

4.4.1 Push Buttons

Table 4-2 below describes the functionality of the board's push buttons (these buttons are not available when the board is installed in a PC). See Figure 4-4 for the locations of these push buttons.

Table 4-2. The MPC8568E MDS Processor Board Push Buttons

SW5 Power-on-Reset	 PRESET	This button is a toggle: If the board is not powered up, pressing button SW5 results in power being supplied to all components on the MPC8568E MDS Processor Board. If the board is powered up, pressing button SW5 removes all power from the components on the MPC8568E MDS Processor Board
SW7 Soft Reset	 SRESET	Pressing button SW7 results in a Soft Reset for the MPC8568E. Despite the reset, clock and chip-select data as well as SDRAM (if installed) contents are retained.
SW8 Hard Reset	 HRESET	Pressing button SW8 results in a Hard Reset for the MPC8568E.

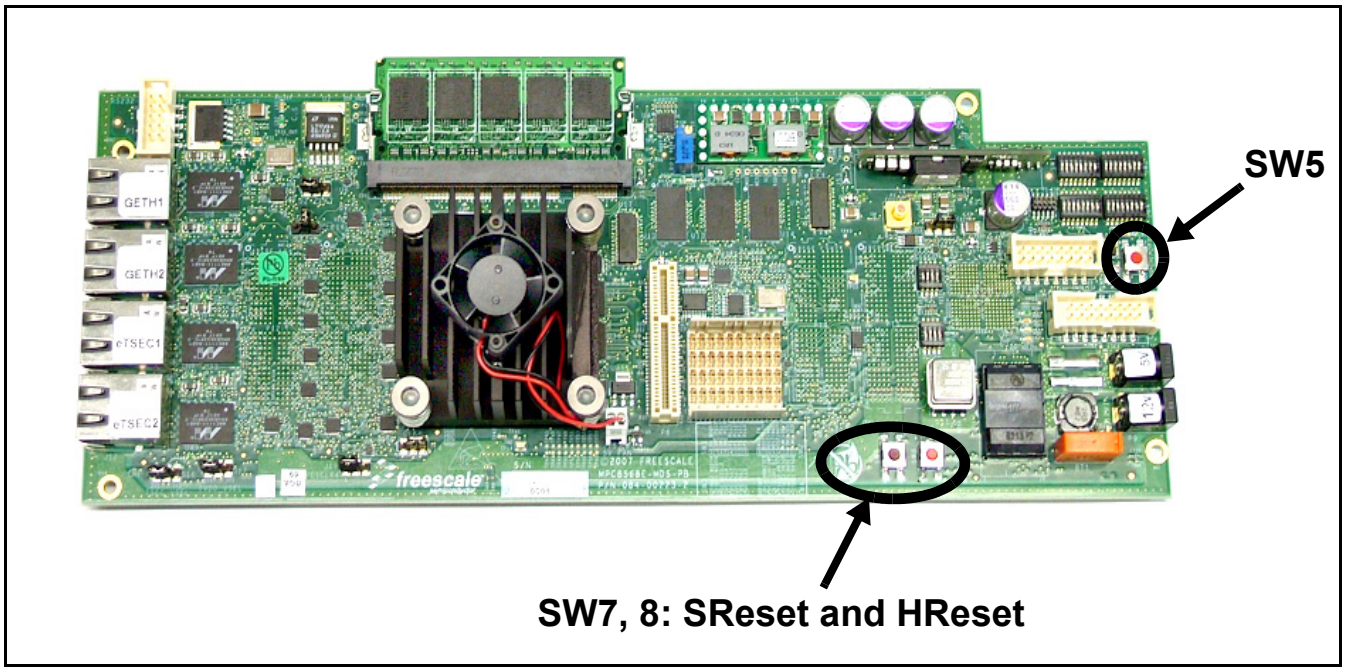


Figure 4-4. MPC8568E MDS Processor Board Push Buttons

Chapter 5
Functional Description

In this chapter the design details of various modules of the MPC8568E MDS Processor Board are described. This includes (but is not limited to) registers, busses, and timing.

5.1 Reset & Reset - Configuration

5.1.1 Reset Clocking and Configuration Initialization

The MPC8568E samples certain configuration pins at Power-On-Reset (POR) negation. These pins can be grouped as follows:

- POR PLL status register (PORPLLSR)
- POR boot mode status register (PORBMSR)
- POR I/O impedance status and control register (PORIMPSCR)
- POR device status register (PORDEVSR)
- POR debug mode status register (PORDBGMSR)

(see the *MPC8568E Reference Manual* for more details).

Figure 5-1 below shows a schematic diagram of the reset circuit, including the various signals and their sources.

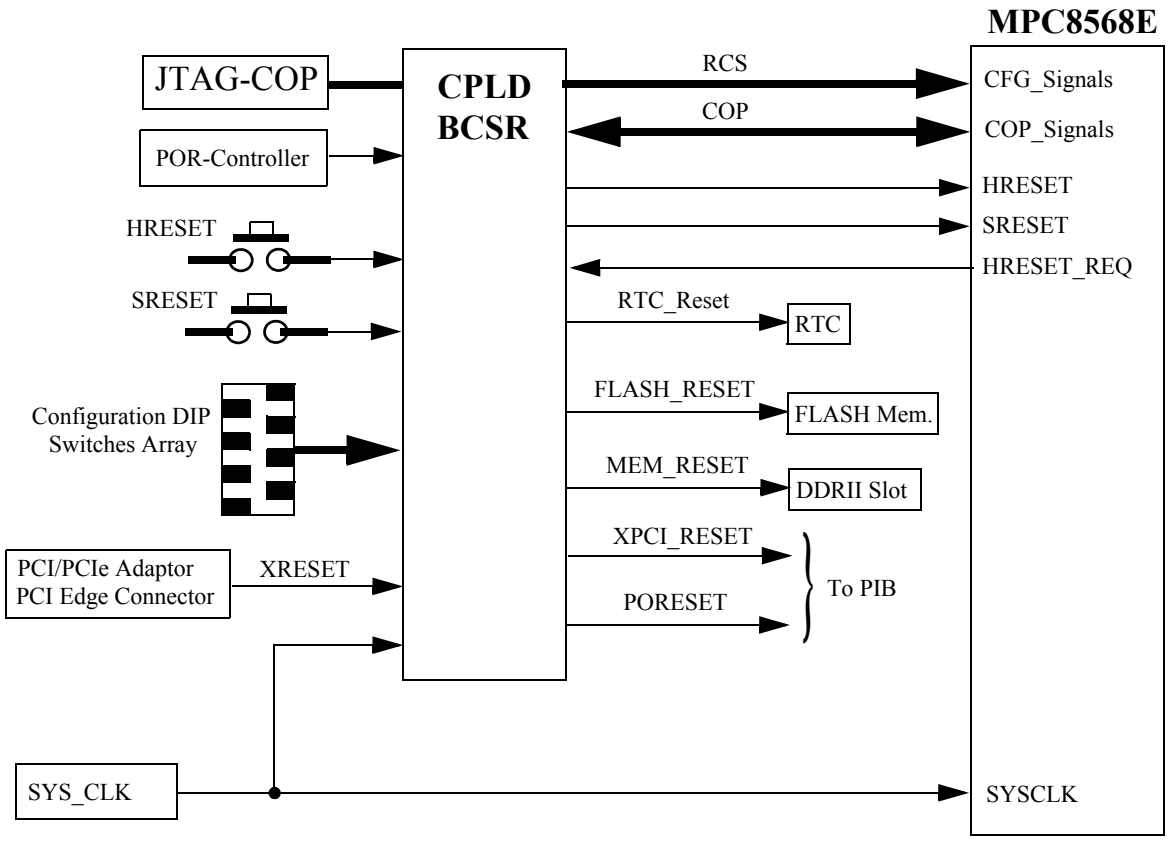


Figure 5-1. Reset Circuit Block Diagram

Once the HRESET signal is negated, the MPC8568E starts to load the Reset Configuration Signals (RCS). These signals are latched from the DIP-switches into appropriate CPLD registers (the BCSR's).

There are two ways to drive the RCS:

- From DIP-switches via the BCSR
- Directly from the BCSR ignoring DIP-switches setting

All the RCS bits can be changed from their initial settings using either the CPLD BCSR through the local bus or using the LLD (low level debugger). The BCSR must then drive HRESET/ PORESET to load a new configuration word to the device. It is possible to read the value of the RCS from the BCSRs.

Figure 5-2 below shows the timing for the reset sequence.

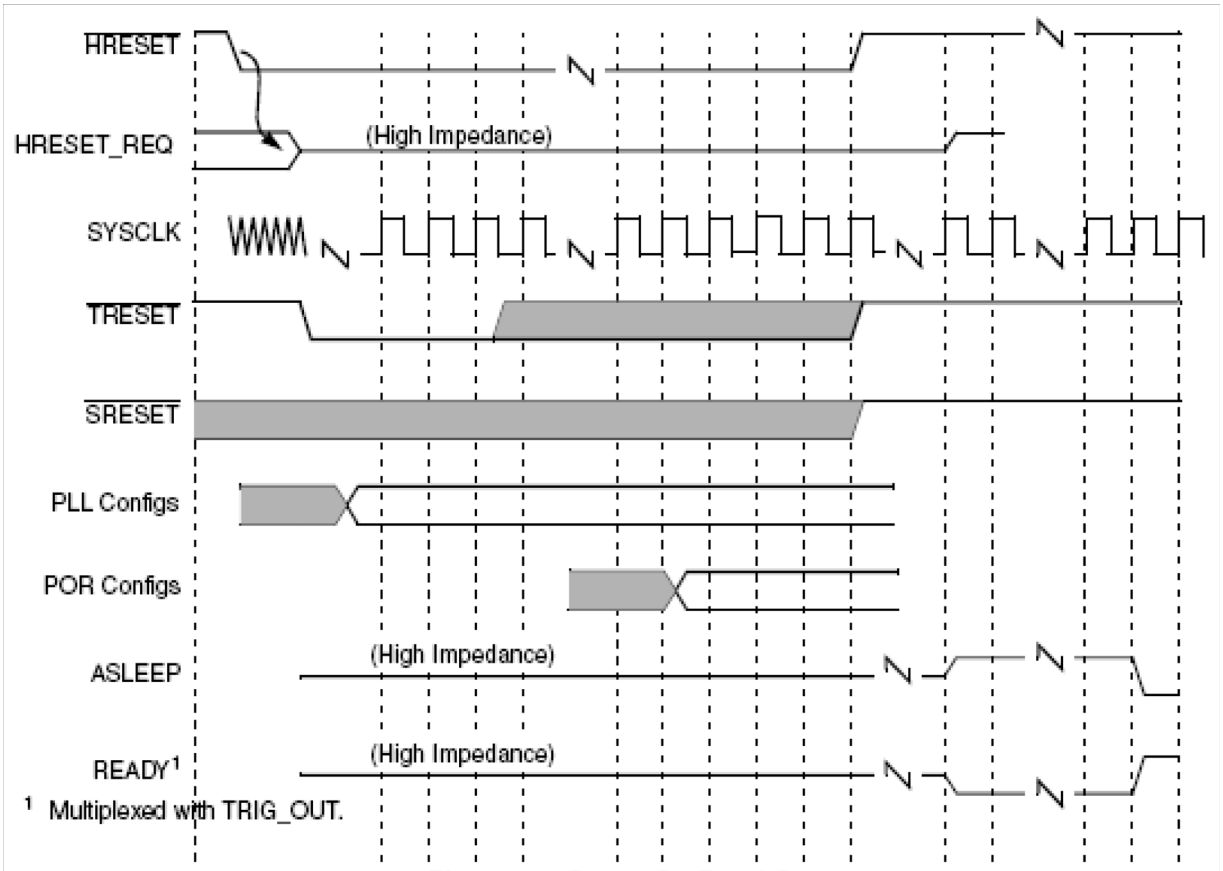


Figure 5-2. Reset Timing Diagram

5.1.2 Reset Circuit

The following are reset sources of the MPC8568E MDS Processor Board:

- Reset controller (DS1834AS from Dallas) - drives the PORESET signal during the time from main power supply (5VDC) connection up to the point at which the 3V output voltage from the On-board PS becomes stable (about 350mS). As soon as this occurs, the CPLD produces corresponding HRESET/SRESET signals to the CPU.
- JTAG COP - can drive HRESET or SRESET, depending on the command given from the JTAG device.
- Push button for HRESET and SRESET (PCI XRST signal is connected to HRESET signal)
- The BCSR (BCSR6[7] = 0 sets PORESET)
- HRESET REQ signal from CPU could initiate HRESET/SRESET sequence from CPLD in case of CPLD corresponding bit set to enable the procedure.

5.1.3 MPC8568E MDS Processor Board Reset Principles

Upon power on: The device DS1834AS drives PORESET low for about 350msec to the CPLD after the 5V and 3V voltages are stable

The BCSR performs initialization procedures, and drives the HRESET/SRESET signals to MPC8568E, FLASH, DDR SODIMM, RTC and PIB (if connected)

In PCI or PCIe Agent mode: When the MPC8568E MDS Processor Board configured and connected as PCI or PCIe Agent (or "endpoint"), PORESET could be driven by Host PCI/PCIe XRST signal.

HRESET & SRESET can be driven through JTAG COP connector, by BCSR, by RTC when it reaches its count value, or by push buttons.

5.1.4 Power-On Reset

The Power-On reset to the MPC8568E MDS Processor Board initializes the processor's and all on-board components' states after power up. A dedicated logic unit asserts MPC8568E HRESET input for a period long enough to cover all MPC8568E voltages and clock stabilization. A HRESET may be generated manually as well by an on-board dedicated push-button (SW8). There are no any functional differences between Power-On and Hard Reset from the MPC8568E's point of view. The only difference from the MPC8568E MDS Processor Board's point of view is that Power-On reset loads the RCS from the DIP-switches via BCSR (default), while HRESET saves the BCSR setting from the previous session.

In addition, a power on reset for the MPC8568E can be done by toggling setting BCSR6[7] = 0.

5.1.5 Hard Reset

Hard Reset may be generated on the MPC8568E MDS Processor Board by any one of the following sources:

- COP/JTAG Port (in Stand-Alone Mode only)
- Manual Hard Reset.
- Board Internal sources.

A Hard Reset, when generated, causes the MPC8568E to reset all its internal hardware except for PLL logic and re-acquires the Hard Reset configuration from its current source. Since Hard Reset also resets the refresh logic for dynamic RAMs, their content is lost as well.

5.1.6 COP/JTAG Port Hard - Reset (stand-alone only)

To provide convenient Hard Reset capability for a COP/JTAG controller, an HRESET line from COP/JTAG port connector muxed with Manual Hard Reset in CPLD U78. The COP/JTAG controller may directly generate a Hard Reset by asserting (low) this line and then drive it from the CPLD to the MPC8568E.

Manual Hard Reset is provided via SW8. In addition, a manual HRESET for the MPC8568E can be done by toggling BCSR6-[7] bit in the CPLD.

5.1.7 Soft Reset

Soft Reset signal to the MPC8568E could be provide or from external JTAG/COP controller or from On-Board SRESET push-button (OR-function realized in U78)

Manual Soft Reset is provided via SW7.

5.2 Default Settings

The default settings for the MPC8568E MDS Processor Board are as follows:

- Clock-In (primary clock) = 66Mhz
- CCB = 400Mhz
- Core Clock = 1000Mhz
- DDR Clock = 200Mhz
- QE Clock = 400Mhz
- Local Bus Clock = 100Mhz
- DDR Type = DDR2
- Boot ROM Location: LB Flash
- PCI - Host, Arbiter Enabled, Drive 25OHm
- PCI_MODE = Asynchronous Clock, >=33MHz
- PCIe - Root Complex, x4, TX/RX Lanes 0:3
- SRIO - Host, Small System Size, x4, TX/RX Lanes 4:7
- CPU Core Boot without external master waiting
- Boot Sequencer disabled (no I^2C ROM asserted)
- eTSEC1/2 operates in standard TBI,RGMII,MII mode
- Lynx Clock = 100Mhz, No Spread

5.3 Clocking

A block diagram of the MPC8568E MDS Processor Board clocking external connections is shown below in Figure 5-3.

MPC8568E clocking internal details block diagram is shown below in Figure 5-4.

There are two modes of PCI Clock operations:

- Agent
- Host

In **PCI Agent mode**, the MPC8568E MDS Processor Board is inserted (using the PCI_PCIe Adaptor) in a PCI-to-PMC adaptor on the PIB or into a PC PCI Slot. In this case, the signal PCIEDGE_ON from the

PCI Edge connector (3V3 PCI) turns the PCI Clock switch to receive the CLK signal from Edge connector and provides it to the MPC8568E device.

In **PCI Host mode**, the edge connector is not connected. As a result, the on-board oscillator provides SYSCLK to the PCICLK input of the MPC8568E device.

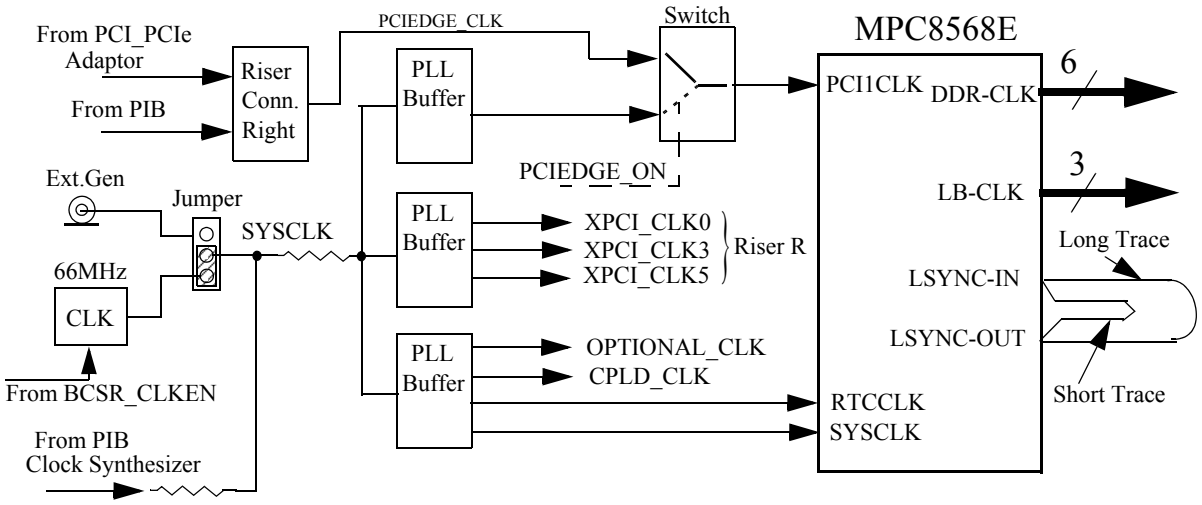


Figure 5-3. Clocks - Showing External Connection Scheme

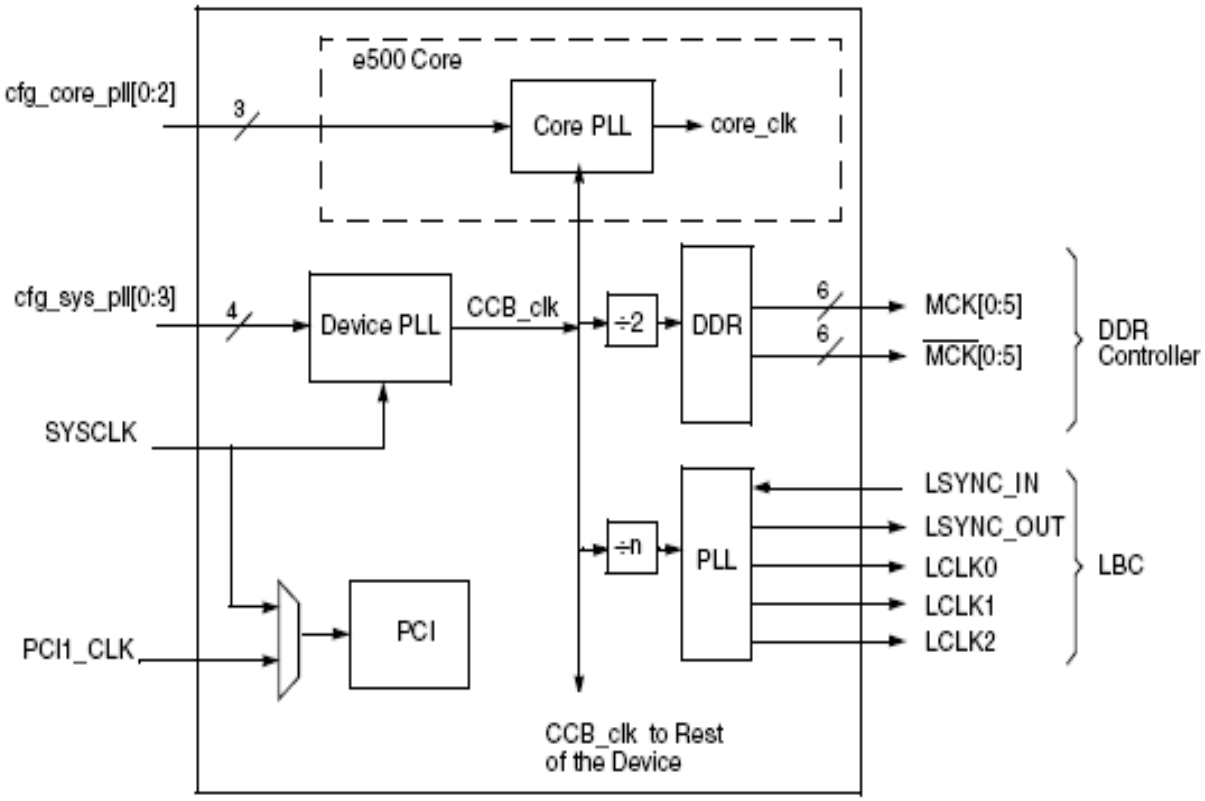


Figure 5-4. Clocks - Internal Details

5.4 Board Control & Status Registers (BCSR) - CPLD device

The CPLD (device U78) contains the BCSRs, each of which is an 8-bit wide read / write register module that controls or monitors various MPC8568E MDS Processor Board operations. The BCSRs are accessed from the Local Bus. The BCSR includes up to 16 registers, but only those registers in use are listed here.

The board control & status registers are duplicated up to 32 times within a CS1 region. This is due to the CS region's 32KB minimum block size and the fact that only address lines A[27-31] are decoded for register selection by the BCSR. The BCSRs are implemented on a Altera CPLD device that provides register and logic functions for some of the MPC8568E MDS Processor Board signals.

The BCSR controls or monitors the following functions:

- Power-on-Reset & Hardware configuration setting for the processor.
- Storage for Hardware Reset Configuration bits (available from the Local Bus)
- Hardware Configuration for both GETH transceivers for QE and eTSEC.
- Enable/Disable to:
  - — Two GETH1,2 and two eTSEC1,2 Transceivers.
  - — Dual RS232 Transceiver.
- Hardware write protection for FLASH and BRD I2C EEPROM .

- Control for software signaling (via three LEDs).
- Status indications, including:
  — PCI Host Mode, which indicates if the Board is working in a Host Mode (Stand-Alone, Independent Host, or PIB Combined) or an Agent (or “endpoint”) Mode
- BCSR Revision code BCSR14[0-3] REV BCSR14[4-7] SUBREV

5.4.1 Programming the BCSRs via the Ethernet port, Ethernet Tap, or Serial port

The BCSRs can be reprogrammed using either the Ethernet Tap, the Ethernet port, the Serial port, or the USB Tap. For instructions on how to do this via the Ethernet Tap, Ethernet port, or Serial port, see the *CodeWarrior* online Help (enter “Reprogramming Firmware” from the Search option). Instructions on reprogramming the BCSRs using the USB Tap are found below.

5.4.2 Programming the BCSRs via the USB Tap

Programming the BCSRs using the USB Tap is done as follows:

1. Insert the interconnection header into the 16-pin header socket for firmware programming (P4) (see Figure 5-5 and Figure 5-6 on page 5-9 for photos of the header and how to insert it, and see Figure 5-7 on page 5-20 for a general view).
2. Connect the USB Tap to the header.
3. Turn off power to the board, then turn on power.
4. Launch CCS and open the CCS command window. The procedure is slightly different on Windows and Linux host machines.
   — For Windows:
   Run the command:
   <CodeWarrior Installation>\ccs\bin\ccs.exe
   This will launch CCS and add a CCS icon ( ) to your taskbar. Double-click that icon in the taskbar to open the command window.
   — For Linux
   Run the command:
   <CodeWarrior Installation>/ccs/bin/ccs
   This will launch CCS and open the command window automatically.
5. In the CCS Command window, do the following:
   a) Initialize the USB Tap by typing (from the root directory):
      – ccs> delete all
      – ccs> config cc utap
   b) Move to the BCSR directory, then type:
      – ccs> cd <path>
      – ccs> ::svf::burn bcsr.svf

c) At this point, the program should be loaded, and you should see output similar to the following:
   – "0: USB TAP (JTAG) (utap:01001762) Loader software ver. {1.8}"
   – "Sending code to USB TAP - please wait"
   – "Wait for a few min"
d) Wait for a few minutes, and the BCSR will then be reprogrammed.
e) Before disconnecting your USB TAP, wait for the flashing status light to turn off.

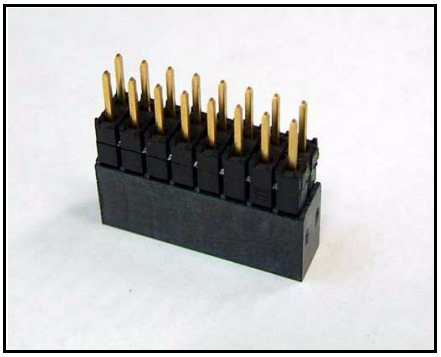


Figure 5-5. Interconnection header

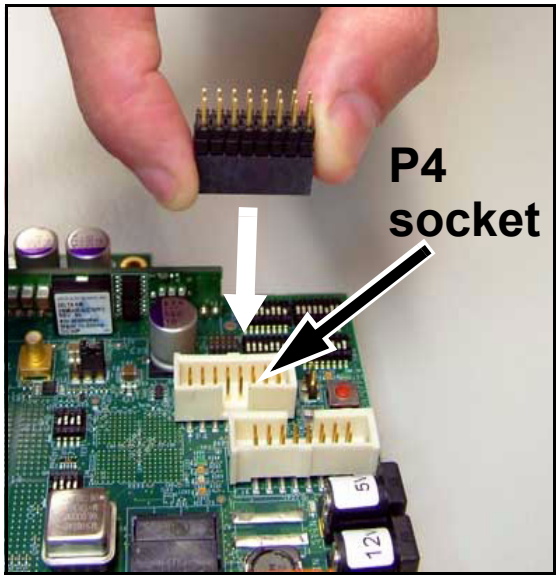


Figure 5-6. Inserting interconnection header

5.4.3 BCSR0 - Board Control / Status Register - 0

Table 5-1. BCSR0 Register Description

Bit #	Config Signals	Function	Default	Att.
[0:3]	CFG_SYS_PLL[0:3]	Establishes the clock ratio between the SYSCLK and the platform clock (CCB) (See See “SW1 Configuration” on page 4-2. for a list of possible values)	SW1/[1:4] Sampled at HRESET [0110]	R,W
[4:6]	CFG_CORE_PLL[0:2]	Sets the ratio between the e500 Core PLL Clock and the platform clock (CCB) (See See “SW1 Configuration” on page 4-2. for a list of possible values)	SW1/[5:7] Sampled at HRESET [101]	R,W
[7]	CFG_BOOT_SEQ[1]	Allows the boot sequencer to load boot configuration data located on the I²C Boot ROM. ‘1’ - Boot sequencer is disabled. No I²C ROM is accessed. ‘0’ - Extended I²C addressing mode is used. Boot sequencer is enabled and loads configuration information from a ROM on the I²C1 interface. A valid ROM must be present.	SW2/[7] Sampled at HRESET [1]	R,W

5.4.4 BCSR1 - Board Control / Status Register - 1

Table 5-2. BCSR1 Register Description

Bit #	Config Signals	Function	Default	Att.
[0:2]	CFG_ROM_LOC[0:2]	Defines from were to load the boot program. Default boot ROM address range of 8MB at address: 0x0_FF80_0000 to 0x0_FFFF_FFFF. (See See “SW2 Configuration” on page 4-3. for a list of possible values)	SW2/[1:3] Sampled at HRESET [110]	R,W
[3:5]	CFG_HOST_AGT[0:2]	Selects the MPC8568 SRIO/PCI/PCIe Host or agent mode. (See See “SW2 Configuration” on page 4-3. for a list of possible values)	SW2/[4:6] Sampled at HRESET [111]	R,W
[6]	CFG_PCI1_IMPD	Defines PCI I/O Impedance configuration ‘0’ - 25 Ohm I/O impedance. ‘1’ - 42 Ohm I/O impedance	SW4/[6] Sampled at HRESET [0]	R,W
[7]	CFG_RIO_SYS_SYZE	Defines Large or small SRIO system size '0' - Small system size up to 256 devices. ‘1’ - Large system size (up to 65,536 devices)	SW4/[5] Sampled at HRESET [0]	R,W

5.4.5 BCSR2 - Board Control / Status Register - 2

Table 5-3. BCSR2 Register Description

Bit #	Config Signals	Function	Default	Att.
[0:4]	CFG_QE_PLL[0:4]	The QE Clock is defined by multiplier and a divisor applied to SYSCLK input, as follows: QE Clock = SYSCLK * (CFG QE PLL[0:4]/CFG_QE_CLK) (See See “SW3 Configuration” on page 4-4. for a list of possible values)	SW3/[1:5] Sampled at HRESET [00110]	R,W
[5]	CFG_QE_VOLT	Sets the voltage of UCC when it works with GETH. ‘0’ - UCC Voltage = 2.5V (for RGMII or RTBI only) ‘1’ - UCC Voltage = 3.3V (for MII, GMII, or TBI)	SW3/[6] Sampled at HRESET [1]	R,W
[6]	CFG_PCI1_ARB	‘0’ - internal PCI arbiter disabled ‘1’ - internal PCI arbiter enabled	SW4/[7] Sampled at HRESET [1]	R,W
7	Reserved	Must be = [1]	[1]	R,W

5.4.6 BCSR3- Board Control / Status Register - 3

On the board, the BCSR3 acts as a control register. The BCSR3, which may be read or written at any time, receives its defaults upon PORESET signal. The BCSR3 fields are described below in **Table 5-4.**:

Table 5-4. BCSR3 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	CFG_TSEC1_REDUCE	Selects eTSEC1 width: ‘0’ - RTBI, RGMII, RMII ‘1’ - TBI, GMII, MII	SW3/[7] Sampled at HRESET [1]	R,W
[1]	CFG_TSEC2_REDUCE	Select eTSEC2 width: ‘0’ - Select RTBI, RGMII, RMII. ‘1’ - Select TBI, GMII, MII	SW3/[8] Sampled at HRESET [1]	R,W
[2:3]	CFG_TSEC1_PRTCL[0:1]	Selects the eTSEC1 protocol: FIFO, GMII, TBI, or MII '10' - (GMII, or RGMII if configured in reduced mode) ‘00’ - Uses 16-bit FIFO protocol (or 8-bit FIFO protocol if configured in reduced mode) ‘01’ - Uses the MII protocol (or RMII if configured in reduced mode) ‘11’ - Uses the TBI protocol (or RTBI if configured in reduced mode)	SW4/[1:2] Sampled at HRESET [10]	R,W

Table 5-4. BCSR3 Register Description

Bit #	Config Signals	Function	Default	Att.
[4:5]	CFG_TSEC2_PRTCL[0:1]	Select the eTSEC2 protocol: FIFO, GMII, TBI, or MII. '10' - (GMII, or RGMII if configured in reduced mode) ‘00’ - Uses 8-bit FIFO protocol ‘01’ - Uses the MII protocol (or RMII if configured in reduced mode) ‘11’ - Uses the TBI protocol (or RTBI if configured in reduced mode)	SW4/[3:4] Sampled at HRESET [10]	R,W
[6]	TSEC3MST	‘0’ - PHY connected to eTSEC1 is Slave. ‘1’ - PHY connected to eTSEC1 is Master.	[1]	R,W
[7]	TSEC4MST	‘0’ - PHY connected to eTSEC2 is Slave. ‘1’ - PHY connected to eTSEC2 is Master.	[1]	R,W

5.4.7 BCSR4- Board Control / Status Register - 4

On the board, the BCSR4 acts as a control register. The BCSR4, which may be read or written at any time, receives its defaults upon PRST signal. The BCSR4 fields are described below in Table 4-5.

Bit #	Config Signals	Function	Default	Att.
[0:3]	Reserved	Not Used	[0000]	R,W
[4]	CLKIOEN	Enable Clock to MPC8568. ‘1’ - Enables onboard clock oscillator. ‘0’ - Disables onboard clock oscillator and enables the clock from PIB clock synthesizer	[1]	R,W
[5]	BOOTWP	BOOT I2C EEPROM Protect: ‘0’ - Allows Write/Read operation of Boot I2C EEPROM ‘1’ - Allows Read only operation of Boot I2C EEPROM	[1]	R,W
[6]	GETHRST	E881111 - GETH Transceivers Reset: ‘1’ - Resets all the TSEC/GETH transceivers. ‘0’ - TSEC/GETH transceivers operate normally.	[0]	R/W
[7]	BRDWP	BRD Write Protect: ‘1’ - BRD EEPROM’s on the PIB & 8568MDS boards are write protected. ‘0’ - Allows the content of the BRD EEPROMs to be updated.	[1]	R,W

5.4.8 BCSR5 - Board Control / Status Register - 5

On the board, the BCSR5 acts as a control register. The BCSR5, which may be read or written at any time, receives its defaults upon PORESET signal. The BCSR5 fields are described below in **Table 5-5.**:

Table 5-5. BCSR5 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	Reserved	Not used	[0]	R,W
[1:3]	LED[1:3]	Debug LED's: '1' - LED(s) ON. '0' - LED(s) OFF.	[000[	R,W
[4]	UPC1	'1' - Enable UPC1. Note: UPC1 will operate as single device multiphy only If UCC2-GETH is enabled (BCSR9[1] = 1) '0' - Enable TDMD, TDME, UCC5-RMII, UCC3-RMII (also disables UPC1).	[0]	R,W
[5]	UPC2	'1' - Enable UPC2. Note: UPC2 will operate as single device multiphy only If UCC1-GETH is enabled (BCSR8[1] = 1) '0' - Enable TDMA, TDMB, TDMC, TDMF, UCC4-RMII, UCC8-RMII, UART1,QE-I2C, SPI-FLASH (also disables UPC2)	[0]	R,W
[6]	UPC2_POS	'1' - POS. Note: BCSR5-[5] must be set to '1' '0' - UTOPIA. Note: BCSR5-[5] must be set to '1'	[0]	R,W
[7]	RS232EN	RS-232 Enable '1' - Enable RS-232 Transceiver '0' - Disable RS-232 Transceiver	[0]	R,W

5.4.9 BCSR6 - Board Control / Status Register - 6

On the board, the BCSR6 acts as a control register. The BCSR6, which may be read or written at any time, receives its defaults upon PRST signal. The BCSR6 fields are described below in **Table 5-5.**:

Table 5-6. BCSR6 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	CFG_SRDS_EN	Enables/disables the SerDes interface '1' - SerDes interface enabled '0' - SerDes interface is disabled. When it is disabled, the Serial RapidIO and PCI Express controllers are also disabled	SW2-8 [1]	R,W
[1]	CPU_BOOT	Enables/Disables the e500 core to boot without waiting for configuration by an external host '1' - The e500 core may boot without waiting for configuration by an external master '0' - CPU boot holdoff mode. The e500 core is prevented from booting until configured by an external master	SW1-8 [1]	R,W
[2]	TSEC0MST	Determines if the PHYAddress_2 is a master or slave '1' - Master '0' - Slave In order to implement a change in this bit, BCSR4[6] must be set to '1', then to '0'	[1]	
[3]	TSEC1MST	Determines if the PHYAddress_3 is a master or slave '1' - Master '0' - Slave In order to implement a change in this bit, BCSR4[6] must be set to '1', then to '0'	[0]	
[4]	Reserved	Not used		
[5]	SPI_EN	Enables the SPI port (of the processor board) '1' - Enable SPI port '0' - Disable SPI port	[0]	
[6]	REGISTER_CONFIG_LED	'1' - PORESET configuration through the BCSR internal registers. Ignore DIP-switch settings '0' - PORESET configuration through DIP-Switches	[0]	R,W
[7]	PORESET	'1' - Normal operation. '0' - Board Power-On Reset.	[1]	R,W

5.4.10 BCSR7 - Board Control / Status Register - 7

On the board, the BCSR7 acts as a control register. The BCSR7, which may be read or written at any time, receives its defaults upon PRST signal. The BCSR7 fields are described below in **Table 5-5.**:

Table 5-7. BCSR7 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	G3DIS_125	'1' - Disable 125MHz output clock of Phy 3 (eTSEC) '0' - Enable 125MHz output clock of Phy 3 (eTSEC)	[0]	R,W
[1]	G3ENA_XC	'1' - Enable exchange line signals for Phy 3. '0' - Disable exchange line signals for Phy 3.	[1]	
[2]	PCIEDGEON	'1' - Indicates that the board operates in Host Mode. '0' - Indicates that the board operates in Agent mode	[1]	R
[3]	G4DIS_125	'1' - Disable 125MHz output clock of Phy 4(eTSEC) '0' - Enable 125MHz output clock of Phy 4(eTSEC)	[0]	R,W
[4]	G4ENA_XC	'1' - Enable exchange line signals for Phy 4. '0' - Disable exchange line signals for Phy 4.	[1]	
[5]	GETH3EN	TSEC1 PHY Address: '1' - Enables PHy (address 0xb 00010) '0' - Disables PHy (address 0xb 00010)	[1]	R,W
[6]	GETH4EN	TSEC2 PHY Address: '1' - Enables PHy (address 0xb 00011) '0' - Disables PHy (address 0xb 00011)	[1]	R,W
[7]	MD_CNT	Determines which MDC/MDIO signal pair will control the PHYs' registers (the pair from the eTSEC block, or the pair from the QE). '1' - The signal pair from the QE controls the PHYs's registers '0' - The signal pair from the eTSEC block controls the PHYs's registers	[0]	R,W

5.4.11 BCSR8 - Board Control / Status Register - 8

On the board, the BCSR8 acts as a control register. The BCSR8, which may be read or written at any time, receives its defaults upon PRST signal. The BCSR8 fields are described below in **Table 5-8.**:

Table 5-8. BCSR8 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	UCC1_GETH_EN	'1' - Enables UCC1 GETH (if BCSR8[1] = 1) '0' - Disables UCC1 GETH. All UCC1 pins routed to PIB. In this case, TDMG is enabled.	[1]	R,W
[1]	UCC1_GMII_EN	'0' - RGMII pins are connected to the UCC1 GETH PHY (If BCSR8[0] = 1) '1' - GMII signals are connected the UCC1 PHY (if BCSR8-[0] = 1)	[1]	R,W

Table 5-8. BCSR8 Register Description

Bit #	Config Signals	Function	Default	Att.
[2]	Reserved	Must be = [0]	[0]	R,W
[3]	UCC1_TBI_EN	'0' - RTBI pins are connected to the UCC1 GETH PHY (if BCSR8[0] = 1) '1' - TBI signals are connected the UCC1 PHY (if BCSR8[0] = 1)	[0]	R,W
[4]	Reserved	Must be = [0]	[0]	R,W
[5]	UCC1_MII_EN	'1' - Enables MII signals for UCC1 PHY. '0' - Disables MII signals for UCC1 PHY. Note: BCSR8[0] must be 0 for this bit to have effect.	[0]	R,W
[6]	Reserved	Must be = [0]	[1]	R,W
[7]	RTC_RESET	'1' - Reset Real Time Clock Device. '0' - Real Time Clock Device normal operation.	[0]	R,W

5.4.12 BCSR9 - Board Control / Status Register - 9

The BCSR9 serves as a 8-bit control register on the board The BCSR9 may be read or written at any time. BCSR9 defaults are attributed at the time of Power-On-Reset or HRESET. BCSR9 fields are described below in **Table 5-9.**:

Table 5-9. BCSR9 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	UCC2_GETH_EN	'1' - Enable UCC2 GETH (if BCSR9[1] = 1) '0' - Disable UCC2 GETH. All UCC2 pins routed to PIB. In this case, TDMH is enabled.	[1]	R,W
[1]	UCC2_GMII_EN	'0' - UCC2 RGMII pins are connected to the UCC2 GETH PHY (If BCSR9[0] = 1) '1' - UCC2 GMII signals are connected the UCC2 PHY (If BCSR9[0] = 1)	[1]	R,W
[2]	Reserved	Must be = [0]	[0]	R,W
[3]	UCC2_TBI_EN	'0' - RTBI pins are connected to the UCC2 GETH PHY (if BCSR9[0] = 1) '1' - TBI signals are connected the UCC2 PHY (if BCSR9[0] = 1)	[0]	R,W
[4]	Reserved	Must be = [0]	[0]	R,W
[5]	UCC2_MII_EN	'1' - Enable MII signals for UCC2 PHY. '0' - Disable MII signals for UCC2 PHY. Note: If BCSR9-[0] = 1 this bit has no effect.	[0]	R,W
[6]	FLASHRDY	Indicates Flash memory operation-ready status '1' - Ready '0' - Busy	[1]	R

Table 5-9. BCSR9 Register Description (continued)

Bit #	Config Signals	Function	Default	Att.
[7]	FLASH_WP	Flash Memory Write Protect '1' - Protect Flash from programming '0' - Flash can be reprogrammed	[0]	R,W

5.4.13 BCSR10 - Board Control / Status Register - 10

The BCSR10 serves as a 8-bit control register on the board The BCSR10 may be read or written at any time. BCSR10 defaults are attributed at the time of Power-On-Reset or HRESET. BCSR10 fields are described below:

Table 5-10. BCSR10 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	S0	PCIe/SRIO Clock select	[1]	R,W
[1]	S1		[0]	R,W
[2]	SS0	PCIe/SRIO Clock spread select	[1]	R,W
[3]	SS1		[1]	R,W
[4]	PCI_CLK_EN	'1' = PCI_CLK enable '0' = PCI_CLK disable	[0]	R,W
[5]	Reserved	Must be = [0]	[0]	R,W
[6]	Reserved	Must be = [0]	[0]	R,W
[7]	Reserved	Must be = [0]	[0]	R,W

5.4.14 BCSR11 - Board Control / Status Register - 11

The BCSR11 serves as a 8-bit control register on the board The BCSR11 may be read or written at any time. BCSR11 defaults are attributed at the time of Power-On-Reset, HRESET, or by setting BCSR4[6] to '1', then to '0'. BCSR11 fields are described below in **Table 5-11.**:

Table 5-11. BCSR11 Register Description

Bit #	Config Signals	Function	Default	Att.
[0]	G0DIS_125	'1' - Disable 125MHz output clock of Phy 0(QE) '0' - Enable 125MHz output clock of Phy 0(QE)	[0]	R,W
[1]	G0ENA_XC	'1' - Enable exchange line signals for Phy 0. '0' - Disable exchange line signals for Phy 0.	[1]	R,W
[2-3]	UCC1_MODE_0_int UCC1_MODE_1_int	Selects the UCC1 GETH mode: RGMII, RTBI, GMII, or TBI. '00' - RGMII '01' - RTBI '10' - GMII '11' - TBI	[10]	R,W

Table 5-11. BCSR11 Register Description (continued)

Bit #	Config Signals	Function	Default	Att.
[4]	G1DIS_125	‘1’ - Disable 125MHz output clock of Phy 1(QE) ‘0’ - Enable 125MHz output clock of Phy 1(QE)	[0]	R,W
[5]	G1ENA_XC	‘1’ - Enable exchange line signals for Phy 1. ‘0’ - Disable exchange line signals for Phy 1.	[1]	R,W
[6-7]	UCC2_MODE_0_int UCC2_MODE_1_int	Selects the UCC2 GETH mode: RGMII, RTBI, GMII, or TBI. '00' - RGMII ‘01’ - RTBI ‘10’ - GMII ‘11’ - TBI	[10]	R,W

5.4.15 BCSR14 - Board Control / Status Register - 14

The BCSR14 acts as a information register. The BCSR14, which may be read or written at any time, receives its defaults upon Power-on signals. The BCSR14 fields are described below in **Table 5-12.**.

Table 5-12. BCSR14 Register Description

Bit #	Config Signals	Function	Value	Att.
[0:3]	REV	BCSR Revision. Four bits revision coding	XXXX (Current version)	R,W
[4:7]	SUBREV	BCSR SUB Revision. Four bits revision coding	XXXX (Current version)	R,W

5.5 External Connections

External connections locations are shown in Figure 5-7, below.

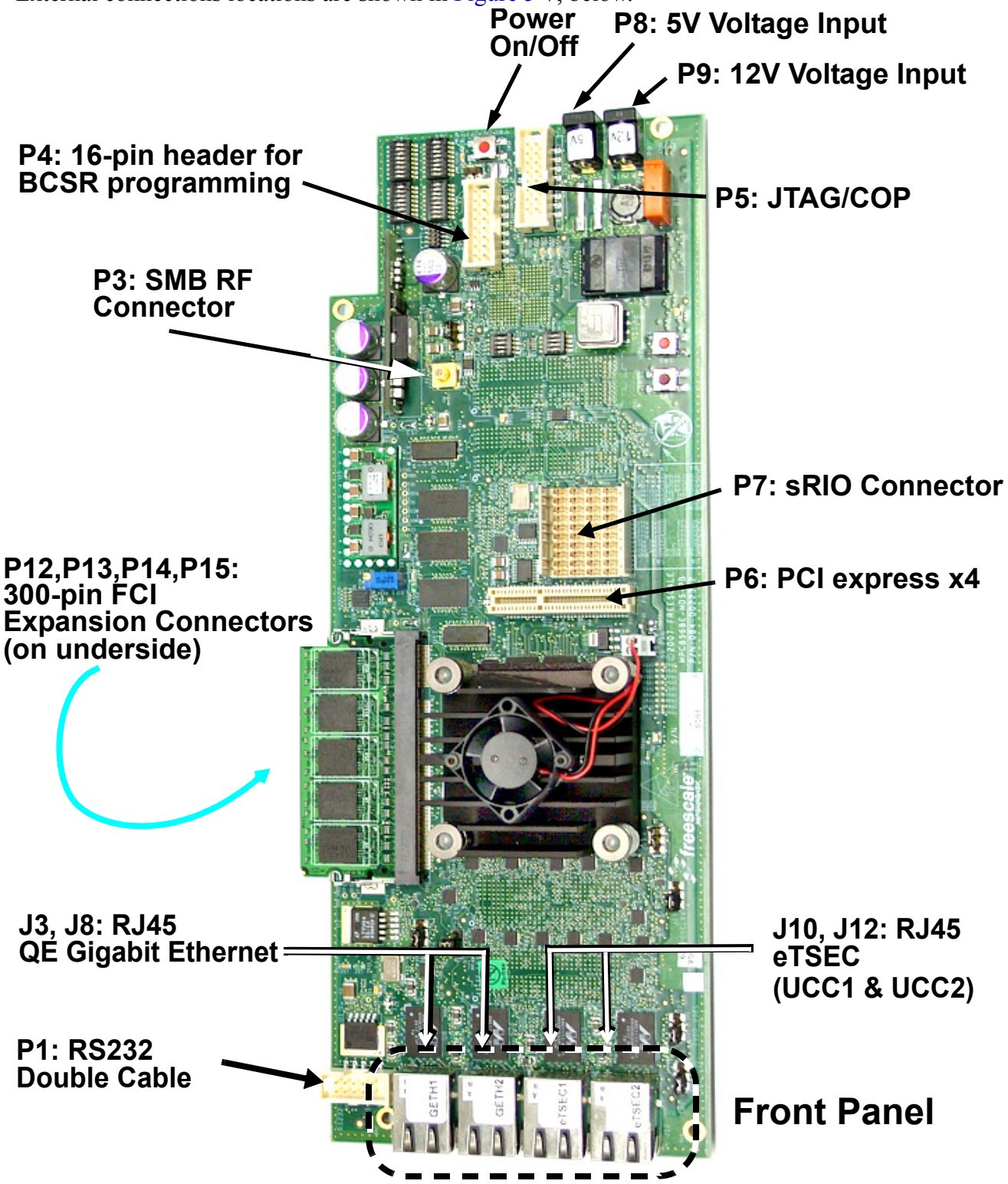

Power On/Off
P8: 5V Voltage Input
P9: 12V Voltage Input
P4: 16-pin header for BCSR programming
P5: JTAG/COP
P3: SMB RF Connector
P7: sRIO Connector
P12,P13,P14,P15: 300-pin FCI Expansion Connectors (on underside)
P6: PCI express x4
J3, J8: RJ45 QE Gigabit Ethernet
J10, J12: RJ45 eTSEC (UCC1 & UCC2)
P1: RS232 Double Cable
Front Panel

Figure 5-7. External Connections for the MPC8568E MDS Processor Board

5.5.1 P1 - DUART Port

The DUART port connector - P1 is implemented with DIL 10-pin Header connector, signals of which are described in **Table 5-13.**

Table 5-13. DUART Port Description

Pin No.	Signal Name	UART Port	Attr.	Description
1	TXD0	1	O	Transmit Data
2	CTS0		O	Clear To Send
3	RXD0		I	Receive Data
4	RTS0		I	Ready To Send
5,10	GND		P	Ground.
6	TXD1	2	O	Transmit Data
7	CTS1		O	Clear To Send
8	RXD1		I	Receive Data
9	RTS1		I	Ready To Send

For connection to regular D-Type-9 RS232 cable use special cable from MPC8568E MDS Processor Board set.

5.5.2 P3 - SMB Connector

RF Subminiature Coaxial Connector P3 is used to connect an external clock to the MPC8568E, which is enabled only when jumper J6(2-3) is closed. Optional.

5.5.3 P4 - CPLD's In-System-Programming (ISP)

This is a 16 pin generic 0.100" pitch header connector, providing In System Programming capability for on board programmable logic devices from Altera (device U78). The pinout of P4 is shown in Table 5-14. "P4 - FPGA Programming ISP Connector" below:

Table 5-14. P4 - FPGA Programming ISP Connector

Pin No.	Signal Name	Attr.	Description
1	ISP_TDO	O	Transmit Data Output.
2,10,12, 16	GND	P	Main GND plane.
3	ISP_TDI	I	Transmit Data In.
4,5,8,11, 13,14,15	N.C.	-	Not Connected.

Table 5-14. P4 - FPGA Programming ISP Connector (continued)

Pin No.	Signal Name	Attr.	Description
6	SENSE	P	Connect to 3.3V power supply bus via protection resistor. Use for programmer powering.
7	ISP_TCK	I	Test port Clock.
9	ISP_TMS	I	Test Mode Select.

5.5.4 P5 - Debug COP Connector

P5 is a Freescale-standard JTAG/COP connector for the PowerPC. It is a 16 pin two row header connector with key. The pinout of P5 is shown in Table 5-15. "P5 - JTAG/COP Connector" below:

Table 5-15. P5 - JTAG/COP Connector

Pin No.	Signal Name	Description
1	TDOc	Transmit Data Output. This is the MPC8568E JTAG serial data output driven by Falling edge of TCK.
2,10,12, 16	GND	Main GND plane.
3	TDIc	Transmit Data In. This is the JTAG serial data input of the MSC8101, sampled on the rising edge of TCK.
4	nTRSTc	Test port Reset. When this signal is active (Low), it resets the JTAG logic. This line is provides a pull-up on the ADS with a 10KΩ resistor.
5	N.C.	Pull-up on the ADS with a 10KΩ resistor.
6	SENSE	Connect to 3.3V power supply bus via pull-up resistor.
7	TCKc	Test port Clock. This clock shifts in / out data to / from the JTAG logic. Data is driven on the falling edge of TCK and is sampled both internally and externally on its rising edge.
8	Check Stop Input	Machine Check Stop Input. This line is provides a pull-up on the ADS with a 10KΩ resistor.
9	TMSc	Test Mode Select. This input selects test mode and is sampled on the rising edge of TCK. This line is qualified with TCK in a same manner as TDI, and changes the state of the JTAG machines. This line is pulled up internally by the MPC8568E.
11	nSRSTc	When asserted by an external H/W, generates Soft Reset sequence for the MPC8568E. Pulled Up on the ADS using a 10KΩ resistor. CAUTION WHEN DRIVEN BY AN EXTERNAL TOOL, THIS PARAMETER MUST BE DRIVEN WITH AN OPEN DRAIN GATE. FAILURE TO DO SO MIGHT RESULT IN PERMANENT DAMAGE TO THE PROCESSOR AND / OR TO ADS LOGIC.

Table 5-15. P5 - JTAG/COP Connector (continued)

Pin No.	Signal Name	Description
13	nHRSTc	When asserted by an external H/W, generates Hard Reset sequence for the MPC8568E. Pulled Up on the ADS using a 10KΩ resistor. When driven by an external tool, **MUST be driven with an Open Drain gate. Failure to do so might result in permanent damage to the processor and / or to ADS logic.**
14	KEY	No pin in connector. Serves for correct plug insertion. See Figure 5-8 for location.
15	Check Stop Output	Machine Check Stop Output. Pulled Up on the ADS using a 10KΩ resistor.

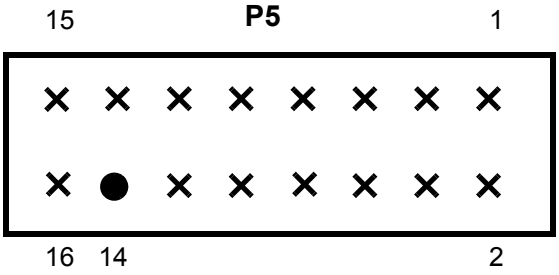


Figure 5-8. P8 COP connector front view

5.5.5 P6 - PCI Express socket

PCIe (x4) socket for PCIe connections.

5.5.6 P7 - sRIO Connector

sRIO socket for sRIO connections.

5.5.7 P8 - Power Connector

P8is 2mm Power Jack RAPC722 which provides a connection to an external power supply +5DC@8A.

5.5.8 P9 - Power Connector

P9is 2mm Power Jack RAPC722 which provides a connection to an external power supply +12DC@8A.

5.5.9 J3,J8,J10,J12- GETH/eTSEC Port Connectors

The GETH/eTSEC connectors, located on the front panel of the MPC8568E MDS Processor Board, are Twisted-Pair (1000-Base-T) compatible connectors. They are implemented with a 90^{o}, 8-pin, RJ45 Combo connector with internal magnetics and two LEDs (indicating communication speed), signals of which are

described in Table 5-16. For location, see Figure 1-1. Green LED indicates 1000Mbit Data rate, Yellow LED is lit when 100Mbit Data rate mode.

Table 5-16. J1, J2, J10, J12 - GETH/eTSEC Port Interconnect Signals

Pin No.	Wire Color	10Base-T/100Base-T Signal	1000 Base-T Signal
1	White	Twisted-Pair Transmit Data positive **output**	BI-DA+
2	White-Orange	Twisted-Pair Transmit Data negative **output**.	BI-DA-
3	White-Green	Twisted-Pair Receive Data positive **input**.	BI-DB+n
4	Blue	Unused	BI-DC+
5	White-Blue	Unused	BI-DC-
6	Green	Twisted-Pair Receive Data negative **input**	BI-DB-
7	White-Brown	Unused	BI-DD+
8	Brown	Unused	BI-DD-

5.6 PCI

5.6.1 General

The MPC8568E PCI interface allows the MPC8568E MDS Processor Board to function as either a PCI host or as a PCI peripheral device (or “agent”).

There are four MPC8568E MDS Processor Board PCI operation configurations, each of which uses the PCI in host or agent mode (indicated):

- Stand alone - Host mode, but PCI interface not used
- Mounted on PIB through Riser Connectors - Host mode
- Mounted on PIB through PMC-to-PCI and PCI/PCIe adaptors - Agent mode
- Installed on PC through PCI/PCIe adaptor - Agent mode

The PCI controller mode of operation is determined at reset by values of the RCS.

5.6.2 PCI Setting when MPC8568E MDS Processor Board is Host

If the MPC8568E MDS Processor Board is in a stand-alone configuration, or on the riser connectors of the PIB (that is, not inserted in a PC, nor inserted on the PIB as an agent, nor as a PCIe or sRIO agent), the RCS should be configured as a PCI Host. This is done by setting DIP-switches. Note that “host” is the default value (see *SW2 Configuration* on page 4-3). The PCI port should be set to internal arbitration. Also

note that in Host Mode the CLKIN pin receives a 66Mhz clock from an external (to the chip) clock oscillator.

5.6.3 PCI Setting when MPC8568E MDS Processor Board is Agent

If the MPC8568E MDS Processor Board is inserted in a PC, or inserted in a PMC slot on the PIB, the processor board must be set to be an “agent”. This is done by setting DIP-switches (see *SW2 Configuration* on page 4-3). The PCI port could be set to internal/external arbitration. The e500 core is prevented from booting until configured by an external master.

Also note that in Agent Mode the PCICLK pin receives a clock from an external (to the board) clock oscillator via the edge connector.

The MPC8568E MDS Processor Board is compatible with PCI specification Revision 2.2. The PCI Interface is 3.3V (32 bit) in Host mode while 3.3V/5V (32 bit) in Agent mode when connected through the PCI_PCIe adaptor. It uses a 32-bit multiplexed, address/data bus that provides 66- and 33-MHz support

5.7 PCI Express (PCIe) and Serial Rapid IO (SRIO)

5.7.1 General

The MPC8568E PCIe/SRIO interface allows the MPC8568E MDS Processor Board to function as Dual High-Speed Interfaces:

- Serial Rapid IO x 4 (1.25Gbps) configured as Host with upper-order device ID bits default to zeros (000). Switch SW4(5) allows the user to select either a Small (up to 256) or Large (up to 65636) system size.
- PCI Express x 4

Default referenced clock for both of them is 100MHz.

In order for the processor board to act as a PCIe and/or sRIO agent (or “endpoint”), it must be configured to do. For more details, see *SW2 Configuration* on page 4-3.

5.7.2 Block Diagram

The Block Diagram of the MPC8568E MDS Processor Board High-Speed Interfaces is shown in Figure 5-9, below:

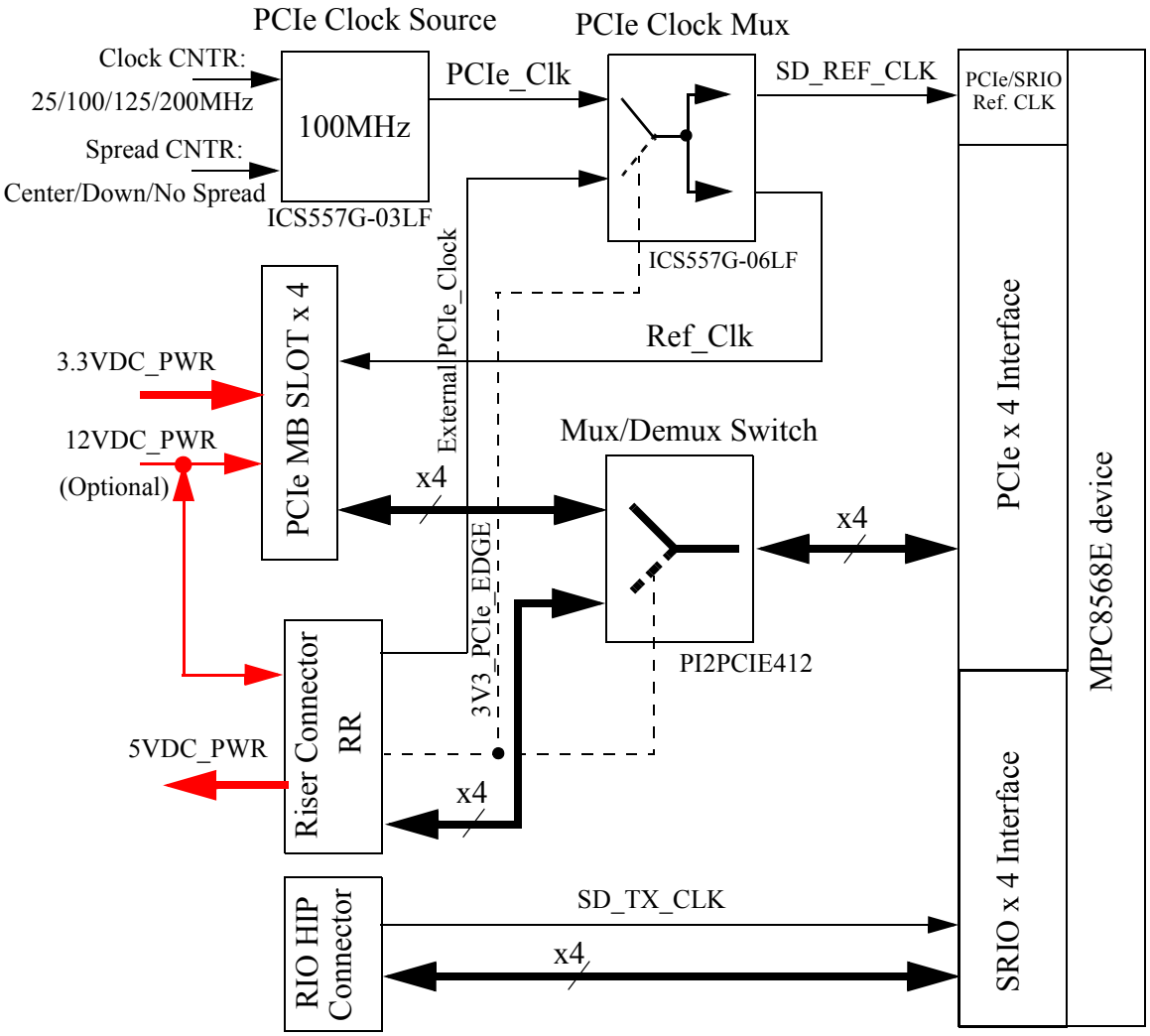


Figure 5-9. High-Speed Interface Block Diagram

5.8 PCI_PCIe Adapter

To provide PCI/PCIe Add-in Card functionality, a special PCI_PCIe Adapter was designed. The adapter's dimensions are a standard full length/height PCI/PCIe add-in card form factor (312x140mm). The PCI_PCIe Adapter provides the following functions:

- Direct interconnection of PCIe x4 signals from Riser connector RR to corresponding PCIe Edge Connector
- Direct interconnection of PCI-32bit 3V3 signals from Riser Connector R to corresponding PCI-32bit 3V3/5V Edge Connector through Bus Switches (SN74CB3T16211DGVR from TI with 5V-tolerant level shifter)

- Automatic disconnection of PCI bus from PCI Edge connector until 3V3 power supply is supplied to the corresponding Edge connector pins (complex inserted into the standard PCI slot)
- Power distribution 5VDC from PCI-edge and PC_PWR connectors to all Riser connectors
- Power distribution 12VDC from PCI-edge, PCIe-edge and PC_PWR connectors to Riser connector RR
- Visual indication of supplied voltages: 5VIN, 12VIN, 3V3_PCI, 3V3PCIe

This card, via Riser connectors, allows the MPC8568E MDS Processor Board to be inserted into a standard PCI-32/64bit or PCIe x4-x16 slot of any compatible system board (PC, other MPC8568E MDS Processor Board etc.). See Section 2.2.2.2 on page 2-9 for photos of the adaptor.

5.9 DDR

The DDR SDRAM Interface supports a 512MByte, up to 533MHz bus at 72-bit widths by using a DDR II/I SODIMM.

DDR connection Block diagram is shown in Figure 5-10:

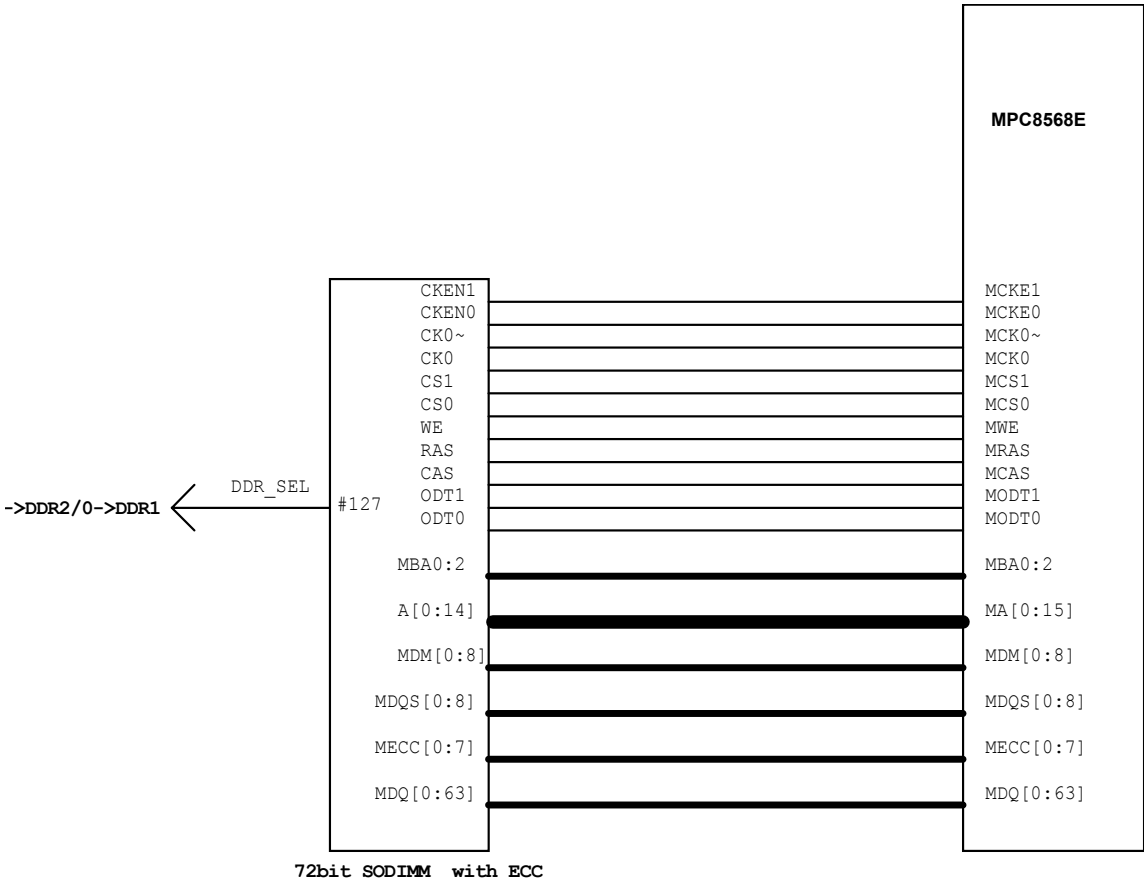


Figure 5-10. DDR Connections Block Diagram

5.10 Local Bus

This section describes devices that are connected to the local bus of the MPC8568E MDS Processor Board.

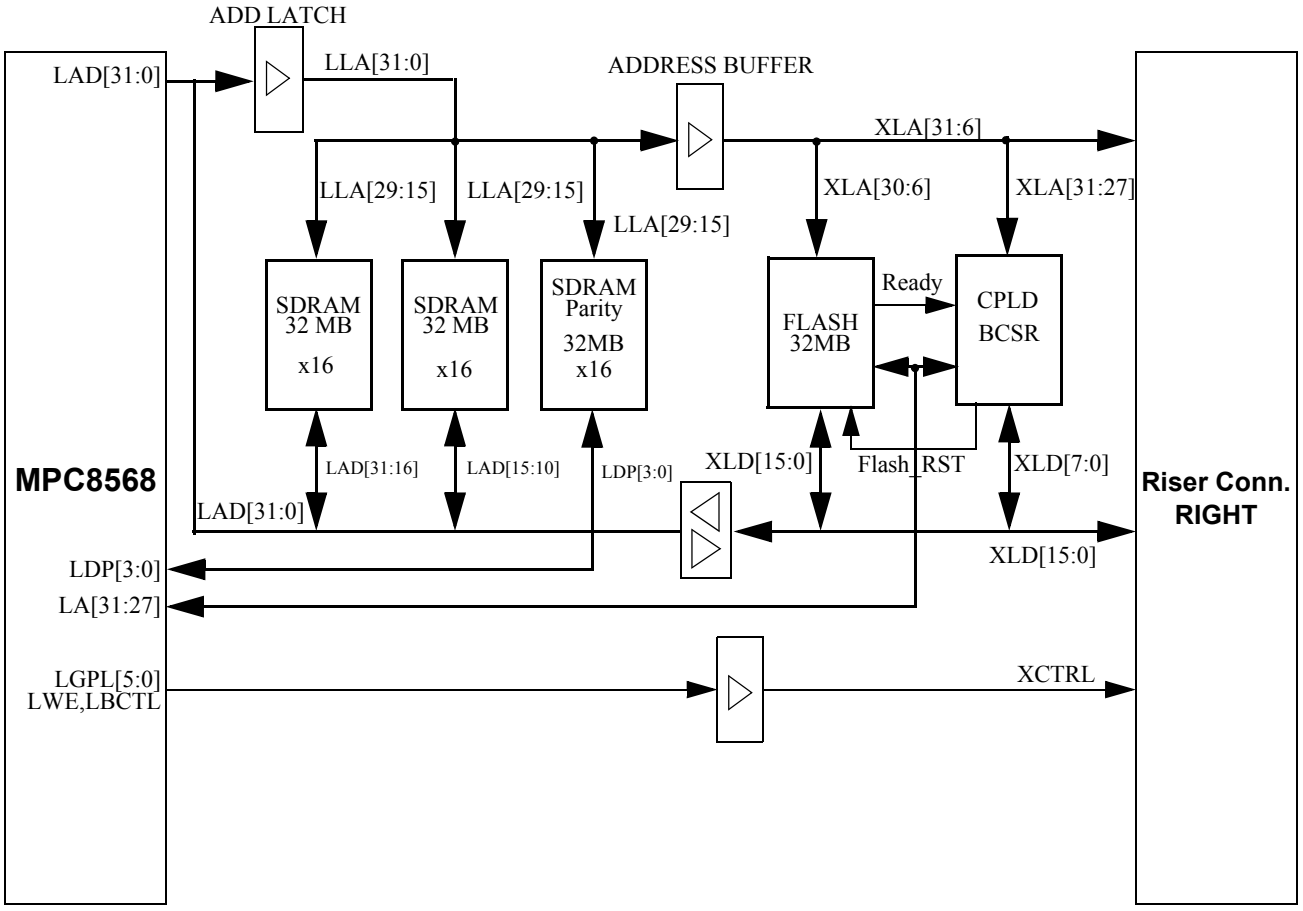


Figure 5-11. Local Bus Scheme

5.10.1 Address Latch/ Data Transceiver

The address latch buffer used is Texas Instruments' 74ALVTH32373ZKER. The address latch buffer latches the addresses and drives them to the fast bus (which includes SDRAM components). It also drives the address to an extra 16-bit buffer (TI's SN74LVCH32244AZKER) for the slow bus, which connects to Flash and BCSR, in addition to PIB components (via riser connectors).

The data transceiver is On-Semi's MC74LCX16245DTG. One side of the buffer is connected to the MPC8568E LAD[0:31]. Only Flash, BCSR and PIB Riser connectors are connected to the other side of the data transceiver.

5.10.2 SDRAM

The SDRAM memory is implemented using three of Micron's MT48LC16M16A2BG-6A:D units. They are organized as 4 Banks x 4M x 16bits, where all input and output levels are compatible with LVTTL. Each one is configured as a 32Mbyte bank. The total capacity achieve a capacity of 64MByte plus 1 device for four bits parity. There is a total of 3 MT48LC16M16A2TG-6 devices. The device has 13 Rows, 11 Column and 2 bits for bank select.

Table 5-17. below describes the local bus address interface to the SDRAM.

The first row in the table (LB ADD) shows the local bus address from A29 to A6 (the logical address). This row also shows that the columns start at A21 and continue to A29. The bank select uses logical address A19 and A20 and the row address uses local bus A6 to A18.

The next row in the table (ROW FOLD) shows how the row address folds over the column address - for example, we can see that the bank select internal A19 and A20 will go out on A15 and A16.

The next row in the table (SDRAM ADD) shows the address pins from the SDRAM point of view. We can see that A10, operates with the command and comes with the rows so that command A10 comes from A8 (LSDA10 is connected to SDRAM A10). The bank selects signals are the MSB address bits in the SDRAM and are latched with the row addresses- that is, they will placed after the rows signals on A15 and A16. The signals connected to the SDRAM is LAD [15:29] while SDRAM A10 is connected to LSDA10.

During the first phase of memory access, the LALE will latch Local Bus Address [6:18] plus bank select A19:A20 on A15:A16. The local bus will then drive LRAS, and the SDRAM device will latch the row and bank select. During the second phase of memory access, the LALE will latch the column on A21:A29, then the local bus will drive LCAS and finally the SDRAM will latch the column.

The parity device is the same device as for D[0:31], as it has the same parameters. The Local Bus Data Parity LDP [0:3] is connected to the SDRAM data D[3:0], and the local bus LPBS signal is connected to the SDRAM DQM. The address pins of the parity device are connected to the same pins as the data devices.

Table 5-17. SDRAM Connection to Local BUS

	Row Connection 13 lines													Bank Select		Column Connection 9 lines								
LB ADD	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29 (LSB)
ROW FOLD										19	20	6	7	8 LSDA10	9	10	11	12	13	14	15	16	17	18
SDRAM ADD										BA1	BA0	A12	A11	A10	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0
Second ALE to LATCH																Column num of COLS 9 lines								
First ALE to LATCH										Bank Sel BSMA = LB (19-20)		ROW num of ROWS 13 lines												
												Address Multiplexed A(6:18) over A(21:29)												

5.10.3 Flash Memory

The Flash memory is implement using Spansion's S29GL256N11TFI020, with a 32MByte capacity. The Flash is connected to the slow bus. The slow bus is organized in such way that the data is obtained from the data transceiver, and the address is obtained from the address buffer.

The Chip Select signal is connected to the CPU CS0~ line to provide booting from the Flash. A special buffer for control signals is used in order to minimize the load on the local bus control signals, which are already used on the SDRAM. Local bus LGPL2/LOE signal control Flash OE and LWE_N0 control Flash WE~ signals.

The Local Bus XLA6 is routed to the flash-socket for optional expansion.

5.11 GETH

GETH ports features are as follows:

- There are four GETH PHYs (Marvel's 88E1111) on the processor board: two connected to the eTSEC ports, and one each to the UCC1 & UCC2 ports.
- The GETH ports are compatible with RGMII or GMII, for 10/100/1000-BaseT or TBI and RTBI for 1000Base-T (Default mode: GMII)
- When working in PIB Combined Mode (when the processor board is a host and is attached to riser connections on PIB) GMII, TBI, RGMII and RTBI are supported on both the MPC8568E MDS Processor Board and on the PIB.
- Four IEEE 802.3 compliant GETH ports with T.P. (10/100/1000-Base-TX) I/F
- The two PHYs that are connected to the eTSEC ports are controlled and configured via the Processor Board's SW3[7,8] & SW4[1,2,3,4] according to the eTSEC power up mode. The status of the PHYs can be read by using BCSR3.
- The MPC8568E's PIO is connected to the two PHYs through UCC1 & UCC2. The selection of the PIO group (GMII,TBI,RGMII,RTBI) are controlled and configured via the Processor Board's BCSR8[0-5] (for UCC1), & BCSR9[0-5] (for UCC2) in all modes. In order to configure the PHYs to the desired mode the user should do it through the PHYs internal registers using MDC & MDIO signals.

Note also the following:

— Some of the PHY configuration parameters require a Soft Reset to activate the new configuration value. See PHY documentation (from Marvel) for a list of such parameters.

— The PHY reset input is driven by either an assertion of HRST (Hard Reset), or by writing '1' to BCSR4[7]. Registers BCSR8[0] , BCSR9[0] are the enable bits for each of the PHYs.

— The PHYs reset any time an HRST (Hard Reset) sequence takes place. The PHY may execute a Soft Reset by asserting bit 15 (MSB) of the 88E1111 control register 0 via the MDC & MDIO signals.

— When the PIB is used *only the reduced modes (RGMII and RTBI) are recommended*.

— Section 5.11.1 to Section 5.11.7 describe in more detail each PHY mode.

5.11.1 GMII Interface

This interface is the default interface upon Power On.

This interface is recommended on this board for the 1000Base-T speed. For 100Base-T and 10Base-T modes, the RGMII interface should be selected.

Figure 5-12. below indicates the signal mapping of the 88E1111 device to the GMII interface. The GMII interface supports GMII-to-copper or GMII-to-fiber connections at the 1000Base-T speed. The GMII interface is selected by setting the 88E1111 HWCFG_MODE [3-0] to 0b1111. It can also be controlled by BCSR8[0-1] &BCSR9[0-1].

If using 1000Base-T speed, a 125MHz input to the MPC8568E is taken from the PHY. Each one of the PHYs drives its own 125MHz clock to the appropriate UCC. The MPC8568E GMII interface transmits a 125MHz clock to the PHY GTX_CLK pin.

In order to select GMII for UCC1, set BCSR8[0,1,2,3,4,5] = 1,1,0,0,0,0. To select GMII for UCC2, set BCSR9[0,1,2,3,4,5] = 1,1,0,0,0,0.

In order to select GMII for eTSEC, use BCSR3 to set the parameters CFG_TSEC1_REDUCE, CFG_TSEC1_PRTCL[0:1], CFG_TSEC2_REDUCE, and CFG_TSEC2_PRTCL[0:1] according to the MPC8568E GMII mode.

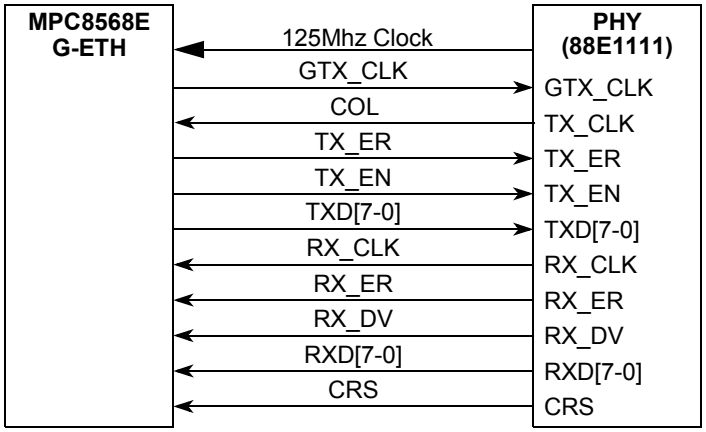


Figure 5-12. GMII Interconnections

5.11.2 Ten Bit Interface (TBI)

The TBI interface pin mapping is shown in Table 5-18. The TBI interface supports the 1000Base-T mode of operation only. The TBI-to-copper interface is selected by software through the MDC and MDIO pins. In order to select TBI for eTSEC, use BCSR3 to set the parameters CFG_TSEC1_REDUCE, CFG_TSEC1_PRTCL[0:1], CFG_TSEC2_REDUCE, and CFG_TSEC2_PRTCL[0:1] according to the MPC8568E TBI mode.
In order to select TBI for UCC1, set BCSR8[0,1,2,3,4,5] = 1,0,0,1,0,0. For UCC2, set BCSR9[0,1,2,3,4,5] = 1,0,0,1,0,0,

Table 5-18. TBI Signals

TBI Signal Names	
TBI Signal Name	**PHY Signal Name**
TBI_TXCLK	GTX_CLK
RXCLK1	TX_CLK
TXD9	TX_ER
TXD8	TX_EN
TXD[7-0]	TXD[7-0]
RX_CLK0	RX_CLK
RXD9	RX_ER
RXD8	RX_DV
RXD[7-0]	RXD[7-0]
external PU	CRS

As shown in Figure 5-13 below, the TBI uses the same signals as the GMII interface.

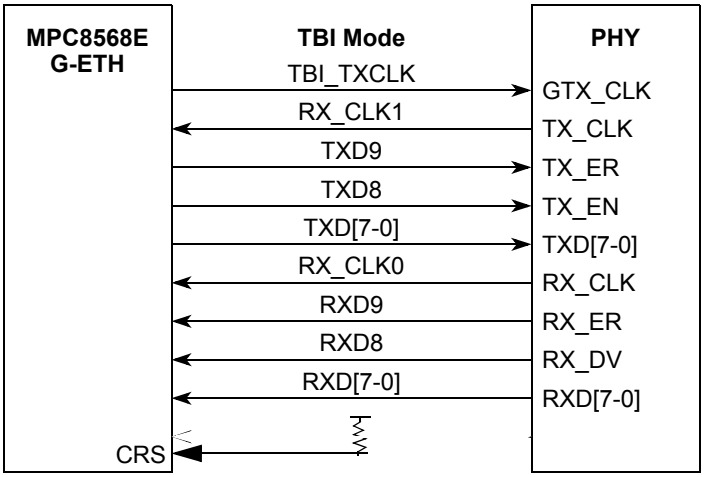


Figure 5-13. TBI Signal Diagram

5.11.3 Reduced Pin Count GMII (RGMII)

This option should be used if 10 or 100Base-T speed is desired. This interface reduces the number of pins between the PHY and the MPC8568E device to 12 pins. The RGMII-to-copper interface is selected by software through the MDC and MDIO pins or by BCSR8[0-5]. See Section 5.4.11 on page 5-15 for more details.

In order to select RGMII for eTSEC, use BCSR3 to set the parameters CFG_TSEC1_REDUCE, CFG_TSEC1_PRTCL[0:1], CFG_TSEC2_REDUCE, and CFG_TSEC2_PRTCL[0:1] according to the MPC8568E RGMII mode.

In order to select RGMII for UCC1, set BCSR8[0,1,2,3,4,5] = 1,0,1,0,0,0. For UCC2, set BCSR9[0,1,2,3,4,5] 1,0,1,0,0,0,.

Table 5-19. RGMII Signals

RGMII Signal Name	PHY Signal Name
GTX_CLK	GTX_CLK
TX_EN	TX_EN
TXD[3-0]	TXD[3-0]
RX_CLK	RX_CLK
RX_CTL	RX_DV
RXD[3-0]	RXD[3-0]

Figure 5-14 below shows the signal mapping between the MPC8568E device and PHY in RGMII mode.

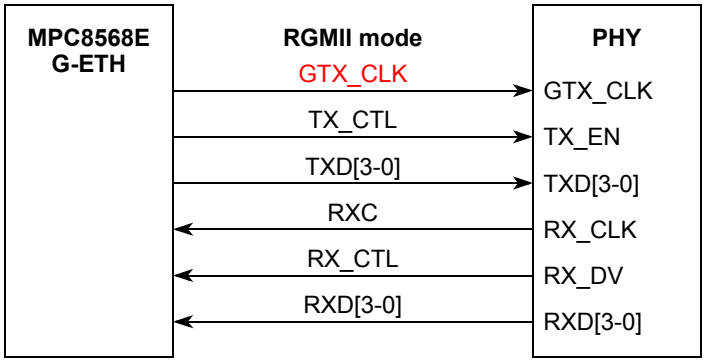


Figure 5-14. RGMII Signal Mapping

5.11.4 Reduced Ten Bit Interface (RTBI)

The RTBI interface pin mapping is shown in Table 5-20. The RTBI supports only 1000Base-T. This interface reduces the number of pins between the PHY and the MPC8568E device to 12 pins. The RTBI-to-copper interface is selected by software through the MDC and MDIO pins.
In order to select RTBI for eTSEC, use BCSR3 to set the parameters CFG_TSEC1_REDUCE, CFG_TSEC1_PRTCL[0:1], CFG_TSEC2_REDUCE, and CFG_TSEC2_PRTCL[0:1] according to the MPC8568E RTBI mode.
In order to select RTBI for UCC1, set BCSR8[0,1,2,3,4,5] = 1,0,0,0,1,0. For UCC2, set BCSR9[0,1,2,3,4,5] = 1,0,0,0,1,0.

Table 5-20. RTBI Signals

RTBI Signal Name	PHY Signal Name
GTX_CLK	GTX_CLK
TD4_TD9	TX_EN

Table 5-20. RTBI Signals (continued)

RTBI Signal Name	PHY Signal Name
TD [0-3]	TXD [3-0]
RCX	RXCLK
RD4_RD9	RX_DV
RD [3-0]	RXD [3-0]

Figure 5-15 shows the signal mapping between the MPC8568E device and PHY in RTBI mode.

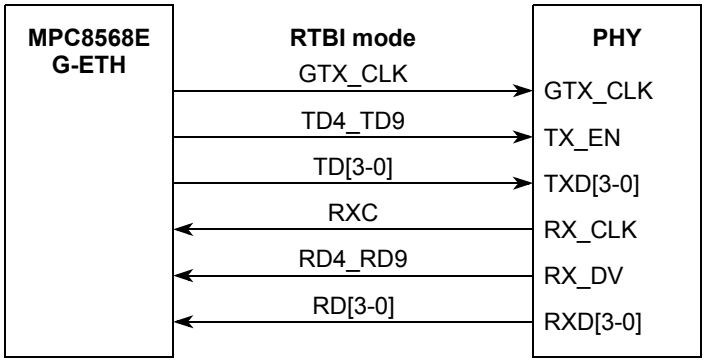


Figure 5-15. RTBI Signal Mapping

5.11.5 MII Interface

The MII interface supports MII-to-copper in 100Base-T, 10Base-T speed. The MII interface is selected by setting the 88E1111 HWCFG_MODE [3-0] to 0b1011. It can also be controlled by BCSR8[0,1,2,3,4,5] &BCSR9[0,1,2,3,4,5].

In order to select MII for UCC1, set BCSR8[0,1,2,3,4,5] = 0,0,0,0,0,1. For UCC2, set BCSR9[0,1,2,3,4,5] = 0,0,0,0,0,1.

In order to select MII for eTSEC, use BCSR3 to set the parameters CFG_TSEC1_REDUCE, CFG_TSEC1_PRTCL[0:1], CFG_TSEC2_REDUCE, and CFG_TSEC2_PRTCL[0:1] according to the MPC8568E MII mode.

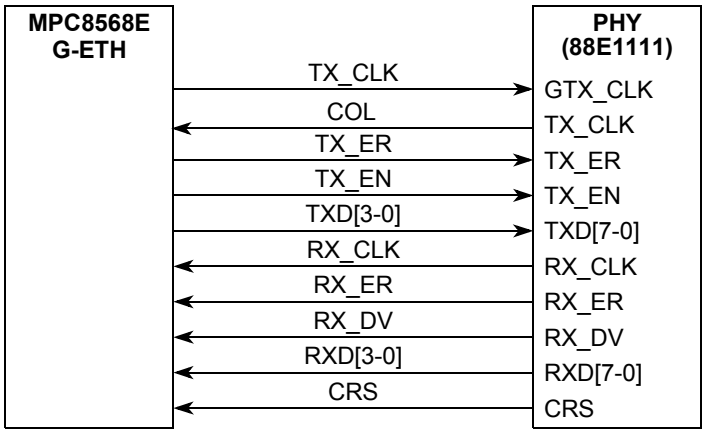


Figure 5-16. MII Signal Mapping

5.11.6 Working with TDM, I2C, UART, SPI, UCC, UPC, and the PIB

The GMII and TBI protocols both take up a great deal of pins. In order to free up some of these pins so that you can work with TDM traffic (for example, using the PQS-MD-T1 module on the PIB), I2C traffic, UART, SPI, UCC, or UPC, do the following:

- To work with TDMD/E (nibble), disable UPC1 by setting BCSR5[4] = 0
- To work with TDMG, disable UCC1 by setting BCSR8[0] = 0, and BCSR8[1,3] = 0
- To work with TDMH, disable UCC2 by setting BCSR9[0] = 0, and BCSR9[1,3] = 0
- To work with TDME (serial), UCC3, UCC5, disable UPC1 by setting BCSR5[4] = 0
- To work with TDMA, TDMB, TDMC, TDMF, I2C, UART1, SPI, UCC4, UCC6, UCC8, disable UPC2 by setting BCSR5[5] = 0

Note that when using the PQS-MD-T1 (TDM) module on the PIB, the PMC-to-PMC adapter must be used (see Section 6.4 on page 6-3 for more details).

Table 5-21 below shows the correspondence of the pins and signals between the MPC8568E device and the TDM module.

— The first column shows the locations of the pins on the MPC8568E (pins not listed do not have a connection to the processor board).

— The second column shows which TDMD signal (if any) is connected to the corresponding pin (assuming BCSR5[4] is set to 0) on the MPC8568E. Note that when working with TDMD in this case, UCC3 and UCC5 must be isolated.

— The third column shows which TDMA,B,C,D,E,F,G,H or UCC3/5 (if any) is connected to the corresponding pin (assuming BCSR5[4] and BCSR5[5] are both 0) on the MPC8568E. If working with UCC3/5, the PQS-MD-T1 module must be disconnected from the PIB.

— The fourth column shows which TDMG,H (if any) is connected to the corresponding pin (assuming BCSR8[0,1,3] = 0 for TDMG, or BCSR9[0,1,3] = 0 for TDMH) on the MPC8568E.

— The fifth column shows the location of the corresponding pins on the riser connections on the bottom of the MPC8568E MDS Processor Board.

— The sixth column shows the location of the corresponding pins on the bottom of the PMC-to-PMC adaptor, and

— The seventh column shows the location of the corresponding pins on the top of the PMC-to-PMC adaptor.

Table 5-21. Configuring the Board for TDM connections

MPC8568E QE - PIN	TDMD (BCSR5[4] = 0 only)[a]	TDMA, B, C, D, E, F,G,H (BCSR5[4] = 0 and BCSR5[5] = 0)	TDMG,H BCSR8[0,1,3] = 0 or BCSR9[0,1,3] = 0	Riser (on PB)	PMC-to-PMC adaptor BOTTOM	PMC-to-PMC adaptor TOP
PE11			TDMG-TXD[0]	P13-A14	PMC0-P3[46]	PMC0-J2[13]
PE14			TDMG-RXD[0]	P13-A19	PMC0-P3[52]	PMC0-J1[55]
PE15			TDMG-TSYNC	P13-A17	PMC0-P3[48]	PMC0-J1[58]
PE16			TDMG-RSYNC	P13-B14	PMC0-P3[60]	PMC0-J1[4]
PE18			TDMG-RXCLK(CLK15)	P13-E1	XMC0-P6[E13]	PMC0-J2[61]
PC7		TDMF-TXD[0]		P12[C28]	PMC0-P3[58]	PMC0-J3[11]
PC8		TDMF-RXD[0]		P12[B26]	XMC0-P6[D13]	PMC0-J3[17]
PC9		TDMF-TSYNC		P12[E26]	XMC0-P6[D9]	PMC0-J3[16]
PC10		TDMF-RSYNC		P12[F25]	XMC0-P6[E11]	PMC0-J3[18]
PD10		TDMA-TXD[0]		P12[D23]	PMC0-P3[34]	PMC0-J2[46]
PD11		TDMA-RXD[0]		P12[C26]	PMC0-P3[30]	PMC0-J1[48]
PD12		TDMA-TSYNC		P12[D25]	XMC0-P6[D11]	PMC0-J2[19]
PC27		TDMA-RSYNC		P12[F30]	PMC0-P3[31]	PMC0-J2[57]
PC30		TDMC-TXD[0]		P12[G26]	PMC0-P3[59]	PMC0-J2[55]
PC31		TDMC-RXD[0]		P12[A22]	PMC0-P3[41]	PMC0-J1[16]
PD4		TDMC-TSYNC		P12[D20]	XMC0-P6[E9]	PMC0-J1[10]
PD5		TDMC-RSYNC		P12[F28]	XMC0-P6[D17]	PMC0-J2[51]
PD6		TDMA,B,C_TXCLK (CLK1)		P12[D19]	PMC0-P2[48]	
PD7		TDMA-RXCLK (CLK2)		P12[C18]	PMC0-P3[25]	PMC0-J3[25]
PD16		TDMB-TXD[0]		P12[E29]	XMC0-P6[E17]	PMC0-J2[23]
PD17		TDMB-RXD[0]		P12[A22]	PMC0-P3[53]	PMC0-J1[47]
PD18		TDMB-TSYNC		P12[K19]	PMC0-P3[4]	PMC0-J3[4]
PD19		TDMB-RSYNC		P12[D22]	PMC0-P3[6]	PMC0-J3[12]

Table 5-21. Configuring the Board for TDM connections (continued)

MPC8568E QE - PIN	TDMD (BCSR5[4] = 0 only)[a]	TDMA, B, C, D, E, F,G,H (BCSR5[4] = 0 and BCSR5[5] = 0)	TDMG,H BCSR8[0,1,3] = 0 or BCSR9[0,1,3] = 0	Riser (on PB)	PMC-to-PMC adaptor BOTTOM	PMC-to-PMC adaptor TOP
PD20		TDMB-RXCLK (CLK5)		P12[K20]	PMC0-P3[10]	PMC0-J3[10]
PD26		TDM,F,G,H_TXCLK (CLK23)		P12[H24]	PMC0-P2[20]	
PD27		TDMF-RXCLK (CLK24)		P12[G28]	PMC0-P3[29]	PMC0-J2[52]
PD22		TDMC-RXCLK (CLK7)		P13[C1]	PMC0-P3[43]	PMC0-J3[43]
PA27		TDME:RXD[1]		P13-J10	PMC0-P1[41]	PMC0-J1[33]
PA28		TDME:RXD[2]		P13-J21	PMC0-P1[16]	PMC0-J2[35]
PA29		TDME:RXD[3]		P13-J15	PMC0-P1[55]	PMC0-J2[39]
PA30		TDME:TXD[1]		P13-G16	PMC0-P2[55]	PMC0-J2[45]
PA31		TDME:TXD[2]		P13-F9	PMC0-P1[29]	PMC0-J1[52]
PB4		TDME:TXD[3]		P13-F8	PMC0-P2[29]	PMC0-J2[42]
PB6		TDMD:RXCLK (CLK14)		P13-H10	PMC0-P1[53]	PMC0-J2[34]
PB9	TDMD:TXD[0]	UCC5:TX_EN		P13-H18	PMC0-P1[60]	PMC0-J3[53]
PB10	TDMD:RXD[0]	UCC5:RXD[1]		P13-H20	PMC0-P1[59]	PMC0-J3[59]
PB11	TDMD:TSYNC	UCC5:RXD[0]		P13-H21	PMC0-P2[49]	PMC0-J3[49]
PB12	TDMD:RSYNC	UCC5:RX_DV		P13-H23	PMC0-P2[8]	PMC0-J3[55]
PB13		TDMD_TXCLK (CLK10)		P13-H24	PMC0-P2[10]	PMC0-J3[61]
PB17		TDME:TXD[0]		P13-F30	PMC0-P2[45]	PMC0-J3[41]
PB18		TDME:RXD[0]		P13-G7	PMC0-P1[52]	PMC0-J3[37]
PB19		TDME:TSYNC		P13-G8	PMC0-P2[43]	PMC0-J3[35]
PB20		TDME:RSYNC		P13-G10	PMC0-P2[32]	PMC0-J3[31]
PB21		TDME:RXCLK (CLK11)		P13-G11	PMC0-P1[26]	PMC0-J3[7]
PB22		TDME_TXCLK (CLK12)		P12-A1	PMC0-P3[1]	PMC0-J2[58]
PB23	TDMD:RXD[1]	UCC3:TXD[1]		P13-F28	PMC0-P3[23]	PMC0-J2[26]
PB24	TDMD:RXD[2]	UCC3:TXD[0]		P13-G29	PMC0-P3[19]	PMC0-J1[49]

Table 5-21. Configuring the Board for TDM connections (continued)

MPC8568E QE - PIN	TDMD (BCSR5[4] = 0 only)[a]	TDMA, B, C, D, E, F,G,H (BCSR5[4] = 0 and BCSR5[5] = 0)	TDMG,H BCSR8[0,1,3] = 0 or BCSR9[0,1,3] = 0	Riser (on PB)	PMC-to-PMC adaptor BOTTOM	PMC-to-PMC adaptor TOP
PB25	TDMD:RXD[3]	UCC3:TX_EN		P13-J18	PMC0-P3[17]	PMC0-J2[48]
PB26	TDMD:TXD[1]	UCC3:RXD[1]		P13-J19	PMC0-P3[11]	PMC0-J1[32]
PB27	TDMD:TXD[2]	UCC3:RXD[0]		P12-A3	PMC0-P3[7]	PMC0-J2[29]
PB28	TDMD:TXD[3]	UCC3:RX_DV		P13-F27	PMC0-P3[5]	PMC0-J2[20]
PF11			TDMH-TXD[0]	P12-B23	PMC0-P3[16]	PMC0-J3[34]
PF14			TDMH-RXD[0]	P12-C10	PMC0-P3[55]	PMC0-J1[54]
PF15			TDMH-TSYNC	P12-B26	PMC0-P3[18]	PMC0-J1[41]
PF16			TDMH-RSYNC	P12-D7	PMC0-P3[37]	PMC0-J3[30]
PF18			TDMH-RXCLK	P13-A10	PMC0-P3[22]	PMC0-J1[20]
PB15		transfer connection for PMC-to-PMC				
PB16		transfer connection for PMC-to-PMC				

[a] For TDMD on PIB, you must isolate the PHY5 on PIB via the MDC&MDIO

Table 5-22 below shows the correspondence of the pins and signals between the MPC8568E device and the PMC slot(s) on the PIB.

- The first column shows the locations of the pins on the MPC8568E (pins not listed do not have a connection to the processor board).
- The second column shows which TDMD signal (if any) is connected to the corresponding pin (assuming BCSR5[4] is set to 0) on the MPC8568E. Note that when working with TDMD in this case, UCC3 and UCC5 must be isolated.
- The third column shows which UCC, SPI, I2C, or UART (if any) is connected to the corresponding pin (assuming BCSR5[4] and BCSR5[5] are both 0) on the MPC8568E. If working with UCC3/5, the PQS-MD-T1 module must be disconnected from the PIB.
- The fourth column shows the location of the corresponding pins on the riser connections on the bottom of the MPC8568E MDS Processor Board.
- The fifth column shows the corresponding pin on the PMC slot of the PIB.

Table 5-22. Configuring the board for TDM, UCC, SPI, I2C, and UART

MPC8568E QE pin.	TDMD (BCSR5[4] = 0 only)[a]	UCC, SPI, I2C, or UART (BCSR5[4] = 0 and BCSR5[5] = 0)	Riser (on PB)	PMC on PIB
PC11		UCC8-TXD[1]	P13-K10	PMC1-J3-18
PC12		UCC8-TXD[0]	P13-J25	PMC1-J3-16
PC13		UCC8-TX_EN	P13-K14	PMC1-J3-22
PC14		UCC8-RXD[1]	P13-K19	PMC1-J3-28
PC15		UCC8-RXD[0]	P13-K17	PMC1-J3-24
PC16		UCC8-RX_DV	P13-J26	PMC1-J3-10
PC20		UCC4:TXD[1]	P13-E15	PMC1-J3-37
PC21		UCC4:TXD[0]	P13-E14	PMC1-J3-35
PC22		UCC4:TX_EN	P13-E17	PMC1-J3-41
PC23		UCC4:RXD[1]	P13-D13	PMC1-J3-42
PC24		UCC4:RXD[0]	P13-E12	PMC1-J3-31
PC25		UCC4:RX_DV	P13-D14	PMC1-J3-25
PB26	TDMD:TXD[1]	UCC3:RXD[1]	P13-E11	PMC1-J3-13
PB27	TDMD:TXD[2]	UCC3:RXD[0]	P13-E9	PMC1-J3-11
PB28	TDMD:TXD[3]	UCC3:RX_DV	P13-E18	PMC1-J3-17
PD23		UCC4,6,8 CLOCK (CLK8)	P13-C3	PMC1-J3-43
PB31 (CLK16)		UCC1:3,5,7 CLK(ODD) Jumper J5[2,3]	P13-G5	PMC1-J3-47

Table 5-22. Configuring the board for TDM, UCC, SPI, I2C, and UART (continued)

MPC8568E QE pin.	TDMD (BCSR5[4] = 0 only)[a]	UCC, SPI, I2C, or UART (BCSR5[4] = 0 and BCSR5[5] = 0)	Riser (on PB)	PMC on PIB
PD28		SPI1-SEL	P14-C3	PMC0-J4-63
PD29		SPI1-CLK	P14-C1	PMC0-J3-28
PD30		SPI1-MOSI	P14-K26	PMC0-J1-64
PD31		SPI1-MISO	P14-G1	PMC0-J2-64
PC18		I2C_CLK1,2	P12-C21	PMCx - J4-62
PC19		I2C_DATA1,2	P12-C19	PMCx - J4-64
PC0		UART1_TXD(SOUT)	P14-H10	PMCx - J4-56
PC1		UART1_RTS	P14-H12	PMCx - J4-48
PC2		UART1_CTS	P14-H14	PMCx - J4-52
PC3		UART1_RXD(SIN)	P14-H9	PMCx - J4-54

[a] For TDMD on PIB, you must isolate the PHY5 on PIB via the MDC&MDIO

Table 5-23 below shows the correspondence of the pins and signals between the MPC8568E device and the PMC slot(s) on the PIB.

- The first column shows the locations of the pins on the MPC8568E (pins not listed do not have a connection to the processor board).
- The second column shows which UCC1 or UCC2 signal (if any) is connected to the corresponding pin on the MPC8568E. In this case, the GMII or TBI protocol is used. Configure UCC1 for GMII by setting BCSR8[0,1] = 1, for TBI by setting BCSR8[0,3] = 1. Configure UCC2 for GMII by setting BCSR9[0,1] = 1, for TBI by setting BCSR9[0,3] = 1.
- The third column shows which UCC1 or UCC2 signal (if any) is connected to the corresponding pin on the MPC8568E. In this case, the RGMII or RTBI protocol is used. Configure UCC1 for RGMII by setting BCSR8[0] = 1, and BCSR8[1] = 0. Configure UCC1 for RTBI by setting BCSR8[0] = 1, and BCSR8[3] = 0. Configure UCC2 for RGMII by setting BCSR9[0] = 1, and BCSR9[1] = 0. Configure UCC2 for RTBI by setting BCSR9[0] = 1, and BCSR9[3] = 0.
- The fourth column shows the location of the corresponding pins on the riser connections on the bottom of the MPC8568E MDS Processor Board.
- The fifth column shows the corresponding pin on the PMC slot of the PIB.

Table 5-23. Configuring the board for UCC1/2 with either GMII/TBI or RGMII/RTBI

MPC8568E QE pin.	UCC1/2 with GMII/TBI protocol (BCSR8[0] = 1 & BCSR8[1,3] = 1 or BCSR9[0] = 1 & BCSR9[1 or 3] = 1)	UCC1/2 with RGMII/RTBI protocol (BCSR8[0] = 1 & BCSR8[1,3] = 0 or BCSR9[0] = 1 & BCSR9[1,3] = 0)	Riser (on PB)	PMC (on PIB)
PE6		SPI2-MDIO	P14-G7	PMC1-J2-52
PE5		SPI2-MDC	P14-G5	PMC1-J2-54
PE7		UCC1:TXD[3] RGMII/RTBI	P13-A13	PMC1-J3-60
PE8		UCC1:TXD[2] RGMII/RTBI	P13-A11	PMC1-J3-58
PE9		UCC1:TXD[1] RGMII/RTBI	P13-A10	PMC0-J3-54
PE10		UCC1:TXD[0] RGMII/RTBI	P13-A8	PMC0-J3-64
PE11		UCC1:TX_EN RGMII/RTBI	P13-A14	PMC0-J3-46
PE12		UCC1:RXD[3] RGMII/RTBI	P13-A22	PMC0-J3-58
PE13		UCC1:RXD[2] RGMII/RTBI	P13-A20	PMC1-J3-54
PE14		UCC1:RXD[1] RGMII/RTBI	P13-A19	PMC0-J3-52
PE15		UCC1:RXD[0] RGMII/RTBI	P13-A17	PMC0-J3-48
PE16		UCC1:RX_DV RGMII/RTBI	P13-B14	PMC0-J3-60
PE17		UCC1:RXCLK (clk9) RGMII/RTBI		P12-F18

Table 5-23. Configuring the board for UCC1/2 with either GMII/TBI or RGMII/RTBI (continued)

MPC8568E QE pin.	UCC1/2 with GMII/TBI protocol (BCSR8[0] = 1 & BCSR8[1,3] = 1 or BCSR9[0] = 1 & BCSR9[1 or 3] = 1)	UCC1/2 with RGMII/RTBI protocol (BCSR8[0] = 1 & BCSR8[1,3] = 0 or BCSR9[0] = 1 & BCSR9[1,3] = 0)	Riser (on PB)	PMC (on PIB)
PE18		UCC1:TXCLK (clk15) MII/TBIRXCLK1	P13-E1	PMC0-J3-6
PE19		UCC1:GTXCLK (clk21) RGMII/RTBI	P13-C30	PMC0-J1-40
PE20	UCC1:TXD[7] GMII/TBI		P13-E15	PMC1-J3-37
PE21	UCC1:TXD[6] GMII/TBI		P13-E14	PMC1-J3-35
PE22	UCC1:TXD[5] GMII/TBI		P13-E11	PMC1-J3-13
PE23	UCC1:TXD[4] GMII/TBI		P13-E9	PMC1-J3-11
PE24	UCC1:TX_ER GMII/TBI		P13-A16	PMC0-J1-48
PE25	UCC1:CRS GMII/TBI		P13-A25	PMC0-J2-57
PE26	UCC1:RXD[7] GMII/TBI		P13-D16	PMC1-J3-7
PE27	UCC1:RXD[6] GMII/TBI		P13-D10	PMC1-J3-1
PE28	UCC1:RXD[5] GMII/TBI		P13-D11	PMC1-J3-5
PE29	UCC1:RXD[4] GMII/TBI		P13-A23	PMC0-J2-46
PE30	UCC1:RX_ER GMII/TBI		P13-B15	PMC0-J2-19
PE31	UCC1:COL GMII/TBI			
PB31(CLK16)	UCC1,UCC2-Input-125M	PMC1-J3-52		P13-C28
PF7		UCC2:TXD[3] RGMII/RTBI	P12-B21	PMC0-J3-4
PF8		UCC2:TXD[2] RGMII/RTBI	P12-B20	PMC0-J3-53
PF9		UCC2:TXD[1] RGMII/RTBI	P12-B18	PMC0-J3-49
PF10		UCC2:TXD[0] RGMII/RTBI	P12-B17	PMC0-J3-35
PF11		UCC2:TX_EN RGMII/RTBI	P12-B23	PMC0-J3-16
PF12		UCC2:RXD[3] RGMII/RTBI	P12-C13	PMC0-J3-31
PF13		UCC2:RXD[2] RGMII/RTBI	P12-C12	PMC0-J3-59
PF14		UCC2:RXD[1] RGMII/RTBI	P12-C10	PMC0-J3-55
PF15		UCC2:RXD[0] RGMII/RTBI	P12-B26	PMC0-J3-18
PF16		UCC2:RX_DV RGMII/RTBI	P12-D7	PMC0-J3-37
PF17		UCC2:RXCLK(clk4) RGMII/RTBI	P12-F15	XMC0-J6-E13
PF18		UCC2:TXCLK(clk17) MII/TBIRXCLK1	P13-A10	PMC0-J1-

Table 5-23. Configuring the board for UCC1/2 with either GMII/TBI or RGMII/RTBI (continued)

MPC8568E QE pin.	UCC1/2 with GMII/TBI protocol (BCSR8[0] = 1 & BCSR8[1,3] = 1 or BCSR9[0] = 1 & BCSR9[1 or 3] = 1)	UCC1/2 with RGMII/RTBI protocol (BCSR8[0] = 1 & BCSR8[1,3] = 0 or BCSR9[0] = 1 & BCSR9[1,3] = 0)	Riser (on PB)	PMC (on PIB)
PF19		UCC2:GTXCLK(clk3) RGMII/RTBI	P12-A13	XMC0-J6-D17
PF20	UCC2:TXD[7] GMII/TBI		P12-E12	PMC1-J3-31
PF21	UCC2:TXD[6] GMII/TBI		P12-E8	PMC1-J3-29
PF22	UCC2:TXD[5] GMII/TBI		P12-D14	PMC1-J3-25
PF23	UCC2:TXD[4] GMII/TBI		P12-D13	PMC1-J3-55
PF24	UCC2:TX_ER GMII/TBI		P12-B24	PMC0-J2-23
PF25	UCC2:CRS GMII/TBI		P12-C16	PMC0-J3-12
PF26	UCC2:RXD[7] GMII/TBI		P12-E17	PMC1-J3-41
PF27	UCC2:RXD[6] GMII/TBI		P12-E20	PMC1-J3-19
PF28	UCC2:RXD[5] GMII/TBI		P12-E18	PMC1-J3-17
PF29	UCC2:RXD[4] GMII/TBI		P12-C15	PMC0-J1-47
PF30	UCC2:RX_ER GMII/TBI		P12-B23	PMC0-J3-16
PF31	UCC2:COL GMII/TBI			
PB31(CLK16)	Input 125Mhz for GMII/RGMII UCC1 & UCC2 Bridge J4[1]&J5[2]			

Table 5-24 below shows the correspondance of the pins and signals between the MPC8568E device and the PMC slot(s) on the PIB.

— The first column shows the locations of the pins on the MPC8568E (pins not listed do not have a connection to the processor board).

— The second column shows which UPC1 or UPC2 signal (if any) is connected to the corresponding pin on the MPC8568E. In this case, the UPC1/2 is configured to carry POS or UTOPIA traffic (single device, multiphy), by setting BCSR5[4] = 1 (for UPC1), or BCSR5[5] = 1 (for UPC2).

— The third column shows which UPC1 or UPC2 signal (if any) is connected to the corresponding pin on the MPC8568E. In this case, the UPC1/2 is configured to carry POS or UTOPIA traffic (multi-device, multiphy), by setting BCSR5[4] = 1 and BCSR9[0,1,3] = 0 (for UPC1), or BCSR5[5] = 1 and BCSR8[0,1,3] = 0 (for UPC2).

— The fourth column shows the location of the corresponding pins on the riser connections on the bottom of the MPC8568E MDS Processor Board.

— The fifth column shows the corresponding pin on the PMC slot of the PIB.

Table 5-24. Configuring the board for UPC1/2 with POS/UTOPIA (single or multi device, multiphy)

MPC8568QE - PIN	UPC1/2 for POS or UTOPIA (single device multiphy) UPC1: BCSR5[4] = 1 UPC2: BCSR5[5] = 1	UPC1/2 for POS or UTOPIA (multi-device multiphy) UPC1: BCSR5[4]=1, BCSR9[0,1,3]=0 UPC2: BCSR5[5]=1, BCSR8[0,1,3]=0	Riser (on PB)	PMC (on PB)
PC25	UPC2:RXADDR[0]		P12[A25]	PMC1-J4-58
PC26	UPC2:RXADDR[1]		P12[A16]	PMC1-J2-13
PC27	UPC2:RXADDR[2]		P12[F30]	PMC1-J1-41
PC28	UPC2:RXADDR[3]		P12[J25]	PMC1-J1-16
PC29	UPC2:RXADDR[4]		P12[A25]	PMC1-J2-55
PC30	UPC2:RXCLAV[0]		P12[G26]	PMC1-J2-35
PE27		UPC2:RXCLAV[1]	P12[A20]	PMC1-J1-48
PE29		UPC2:RXCLAV[2]	P12[H24]	PMC1-J2-23
PE31		UPC2:RXCLAV[3]	P12[G9]	
PD22	UPC2:RXCLK(CLK7)		P13[C1]	PMC1-J3-42
PD21	UPC2:RXD[0]		P12[K22]	PMC1-J2-10
PD20	UPC2:RXD[1]		P12[K20]	PMC1-J2-8
PD19	UPC2:RXD[2]		P12[D22]	PMC1-J2-49
PD18	UPC2:RXD[3]		P12[K19]	PMC1-J1-59

Table 5-24. Configuring the board for UPC1/2 with POS/UTOPIA (single or multi device, multiphy) (continued)

MPC8568QE - PIN	UPC1/2 for POS or UTOPIA (single device multiphy) UPC1: BCSR5[4] = 1 UPC2: BCSR5[5] = 1	UPC1/2 for POS or UTOPIA (multi-device multiphy) UPC1: BCSR5[4]=1, BCSR9[0,1,3]=0 UPC2: BCSR5[5]=1, BCSR8[0,1,3]=0	Riser (on PB)	PMC (on PB)
PD17	UPC2:RXD[4]		P12[A22]	PMC1-J1-60
PD16	UPC2:RXD[5]		P12[E29]	PMC1-J2-9
PD15	UPC2:RXD[6]		P13[B12]	PMC1-J2-47
PD14	UPC2:RXD[7]		P12[F27]	PMC1-J1-53
PC8	UPC2:RXD[8]		P12[B26]	PMC1-J1-61
PC7	UPC2:RXD[9]		P12[C28]	PMC1-J2-54
PC6	UPC2:RXD[10]		P12[E30]	PMC1-J2-39
PC5	UPC2:RXD[11]		P12[C25]	PMC1-J2-42
PC4	UPC2:RXD[12]		P12[J18]	PMC1-J4-5
PC3	UPC2:RXD[13]		P12[K23]	PMC1-J1-37
PC2	UPC2:RXD[14]		P12[J24]	PMC1-J2-38
PC1	UPC2:RXD[15]		P12[H29]	PMC1-J1-36
PD5	UPC2:RXENB[0]		P12[F28]	PMC1-J1-33
PE21		UPC2:RXENB[1]	P12[K25]	PMC1-J2-57
PE23		UPC2:RXENB[2]	P12[A17]	PMC1-J1-20
PE25		UPC2:RXENB[3]	P13[C9]	PMC2-J1-13
PC0	UPC2:RXPRTY		P12[G22]	PMC1-J1-46
PC9	UPC2:RXSOC		P12[E26]	PMC1-J1-43
PC20	UPC2:TXADDR[0]		P12[J22]	PMC1-J1-58
PC21	UPC2:TXADDR[1]		P12[H27]	PMC1-J1-55
PC22	UPC2:TXADDR[2]		P12[G25]	PMC1-J1-54
PC23	UPC2:TXADDR[3]		P12[E27]	PMC1-J1-10
PC24	UPC2:TXADDR[4]		P12[E24]	PMC1-J2-51
PC31	UPC2:TXCLAV[0]		P12[A22]	PMC1-J1-29
PE26		UPC2:TXCLAV[1]	P12[J21]	PMC1-J2-46
PE28		UPC2:TXCLAV[2]	P12[K17]	PMC1-J1-47
PE30		UPC2:TXCLAV[3]	P12[F12]	
PD13	UPC2:TXD[0]		P12[A23]	PMC1-J1-26

Table 5-24. Configuring the board for UPC1/2 with POS/UTOPIA (single or multi device, multiphy) (continued)

MPC8568QE - PIN	UPC1/2 for POS or UTOPIA (single device multiphy) UPC1: BCSR5[4] = 1 UPC2: BCSR5[5] = 1	UPC1/2 for POS or UTOPIA (multi-device multiphy) UPC1: BCSR5[4]=1, BCSR9[0,1,3]=0 UPC2: BCSR5[5]=1, BCSR8[0,1,3]=0	Riser (on PB)	PMC (on PB)
PD12	UPC2:TXD[1]		P12[D25]	PMC1-J2-32
PD11	UPC2:TXD[2]		P12[C26]	PMC1-J2-43
PD10	UPC2:TXD[3]		P12[D23]	PMC1-J1-52
PD9	UPC2:TXD[4]		P12[H26]	PMC1-J2-45
PD8	UPC2:TXD[5]		P12[B24]	PMC1-J2-48
PD7	UPC2:TXD[6]		P12[C18]	PMC1-J2-20
PD6	UPC2:TXD[7]		P12[D19]	PMC1-J1-21
PC18	UPC2:TXD[8]		P12[E21]	PMC1-J1-22
PC17	UPC2:TXD[9]		P12[F24]	PMC1-J2-22
PC16	UPC2:TXD[10]		P12[G23]	PMC1-J1-23
PC15	UPC2:TXD[11]		P12[C24]	PMC1-J1-49
PC14	UPC2:TXD[12]		P12[J19]	PMC1-J2-26
PC13	UPC2:TXD[13]		P12[K16]	PMC1-J1-27
PC12	UPC2:TXD[14]		P12[A19]	PMC1-J1-28
PC11	UPC2:TXD[15]		P12[B23]	PMC1-J2-28
PD4	UPC2:TXENB[0]		P12[D20]	PMC1-J2-29
PE24		UPC2:TXENB[1]	P12[B21]	PMC1-J2-19
PE22		UPC2:TXENB[2]	P12[G28]	PMC1-J1-17
PE20		UPC2:TXENB[3]	P12[G14]	
PC10	UPC2:TXPRTY		P12[F25]	PMC1-J2-31
PC19	UPC2:TXSOC		P12[E23]	PMC1-J1-32
PD25	UPC2:REOP		UPC2:TXEN1 P12[B21]	PMC1-J1-13
PD26	UPC2:RERR		UPC2:RXCLAV2 P12[H24]	
PD24	UPC2:RMOD		UPC2:RXCLAV1 P12[A20]	
PD28	UPC2:RVAL		UPC2:TXCLAV2 P12[K17]	

Table 5-24. Configuring the board for UPC1/2 with POS/UTOPIA (single or multi device, multiphy) (continued)

MPC8568QE - PIN	UPC1/2 for POS or UTOPIA (single device multiphy) UPC1: BCSR5[4] = 1 UPC2: BCSR5[5] = 1	UPC1/2 for POS or UTOPIA (multi-device multiphy) UPC1: BCSR5[4]=1, BCSR9[0,1,3]=0 UPC2: BCSR5[5]=1, BCSR8[0,1,3]=0	Riser (on PB)	PMC (on PB)
PD27	UPC2:STPA		UPC2:TXEN2 P12[G28]	
PD30	UPC2:TEOP		XUPC2_RXEN1 P12[K25]	
PD31	UPC2:TERR		XUPC2_TXCLAV1 P12[J21]	
PD29	UPC2:TMOD		UPC2:RXEN2 P12[A17]	
PD23	UPC2:TXCLK(CLK8)		P12[A28]	
PA9	UPC1:TXSOC		PMC0-J1-32	P13-E21
PA1	UPC1:TXD[15]		PMC0-J2-28	P13-F10
PA2	UPC1:TXD[14]		PMC0-J1-28	P13-F12
PA3	UPC1:TXD[13]		PMC0-J1-27	P13-F13
PA4	UPC1:TXD[12]		PMC0-J2-26	P13-F15
PA5	UPC1:TXD[11]		PMC0-J1-49	P13-F16
PA6	UPC1:TXD[10]		PMC0-J1-23	P13-F18
PA7	UPC1:TXD[9]		PMC0-J2-22	P13-F19
PA8	UPC1:TXD[8]		PMC0-J1-22	P13-F21
PB14	UPC1:TXD[7]		PMC0-J1-21	P13-F22
PB15	UPC1:TXD[6]		PMC0-J2-20	P13-F24
PB16	UPC1:TXD[5]		PMC0-J2-48	P13-F25
PB28	UPC1:REOP		PMC0-J3-5	P13-F27
PB23	UPC1:TEOP		PMC0-J2-23	P13-F28
PB17	UPC1:TXD[4]		PMC0-J2-45	P13-F30
PB4	UPC1:TxENB[0]		PMC0-J2-29	P13-F8
PA31	UPC1:TxCLAV[0]		PMC0-J1-29	P13-F9
PB20	UPC1:TXD[1]		PMC0-J2-32	P13-G10
PB21	UPC1:TXD[0]		PMC0-J1-26	P13-G11
PA19	UPC1:RXSOC		PMC0-J1-43	P13-G13

Table 5-24. Configuring the board for UPC1/2 with POS/UTOPIA (single or multi device, multiphy) (continued)

MPC8568QE - PIN	UPC1/2 for POS or UTOPIA (single device multiphy) UPC1: BCSR5[4] = 1 UPC2: BCSR5[5] = 1	UPC1/2 for POS or UTOPIA (multi-device multiphy) UPC1: BCSR5[4]=1, BCSR9[0,1,3]=0 UPC2: BCSR5[5]=1, BCSR8[0,1,3]=0	Riser (on PB)	PMC (on PB)
PB5	UPC1:RxENB[0]		PMC0-J1-33	P13-G14
PA30	UPC1:RxCLAV[0]		PMC0-J2-35	P13-G16
PA11	UPC1:RXD[15]		PMC0-J1-36	P13-G17
PA12	UPC1:RXD[14]		PMC0-J2-38	P13-G19
PA13	UPC1:RXD[13]		PMC0-J1-37	P13-G20
PA14	UPC1:RXD[12]		PMC0-J4-5	P13-G22
PA15	UPC1:RXD[11]		PMC0-J2-42	P13-G23
PA16	UPC1:RXD[10]		PMC0-J2-39	P13-G25
PA17	UPC1:RXD[9]		PMC0-J2-54	P13-G26
PA18	UPC1:RXD[8]		PMC0-J1-61	P13-G28
PB24	UPC1:TERR		PMC0-J3-19	P13-G29
PB18	UPC1:TXD[3]		PMC0-J1-52	P13-G7
PB19	UPC1:TXD[2]		PMC0-J2-43	P13-G8
PB6	UPC1:RXD[7]		PMC0-J1-53	P13-H10
PA10	UPC1:RXPRTY		PMC0-J1-46	P13-H12
PB7	UPC1:RXD[6]		PMC0-J2-49	P13-H14
PB8	UPC1:RXD[5]		PMC0-J2-9	P13-H15
PA0	UPC1:TXPRTY		PMC0-J2-31	P13-H17
PB9	UPC1:RXD[4]		PMC0-J1-60	P13-H18
PB10	UPC1:RXD[3]		PMC0-J1-59	P13-H20
PB11	UPC1:RXD[2]		PMC0-J2-49	P13-H21
PB12	UPC1:RXD[1]		PMC0-J2-8	P13-H23
PB13	UPC1:RXD[0]		PMC0-J2-10	P13-H24
PA23	UPC1:TxADDR[3]		PMC0-J1-10	P13-H27
PA25	UPC1:RxADDR[0]		PMC0-J1-4	P13-H29
PA20	UPC1:TxADDR[0]		PMC0-J1-58	P13-H30

Table 5-25 below shows the pins and functions (UCC6 & UCC7) that are not supported by the MPC8568E MDS Processor Board and the PIB.

Table 5-25. Functions not supported

MPC8568 QE - PIN (not in use by PB)	Function (not supported for RMII on PIB)
PD13	UCC6:TXD[1]
PD14	UCC6:TXD[0]
PD15	UCC6:TX_EN
PD16	UCC6:RXD[1]
PD17	UCC6:RXD[0]
PD18	UCC6:RX_DV
PA17	UCC7:TXD[1]
PA18	UCC7:TXD[0]
PA19	UCC7:TX_EN
PA20	UCC7:RXD[1]
PA21	UCC7:RXD[0]
PA22	UCC7:RX_DV

5.11.7 RMII via the PIB

The PIB contains the RTL8208 PHY device, which supports an 8-port integrated physical layer and transceiver for 10Base-T and 100Base-TX. When used with the MPC8568E MDS Processor Board, 6 of these 8 ports can be utilized, and are connected to UCC(1,2,3,4,5,8).

The input clock to the RTL8208 device is 50MHz, arriving from the clock oscillator. This input clock is split to 2x50MHx lines: one to the MPC8568E Clock-16, and the other to Clock-8. Clock-16 is the only clock that can supply the UCC RMII or the ODD UCC. Clock-7 can be used for the Even-numbered UCCs.

5.12 Debugging Applications

5.12.1 Stand-Alone, Host/Agent on PIB, Independent Host, PCIe/sRIO Agent

Chip debugging is provided via the JTAG port. While the MPC8568E MDS Processor Board functions as a host (on PIB riser connectors, Stand-Alone, or Independent Host), the standard 16-pin COP connector (P5), is used to connect a USB Tap to which a PC with *CodeWarrior®* is connected.

5.12.2 Inserted in a PC

When the MPC8568E MDS Processor Board is plugged into a PC's PCI slot through PCI/PCIe adaptor, it functions as an PCI or PCIe agent (endpoint). Access to the COP interface is available via the PCI or PCIe bus and a special register called the CCR (described below). In this case, the PC acts as a host, and debugging is carried out using *CodeWarrior®* (or a similar IDE) installed on the PC.

For debugging purposes, the PC host may download program code to an inbound memory window in the address space of the MPC8568E MDS Processor Board e.g. DDR or SDRAM on its local bus.

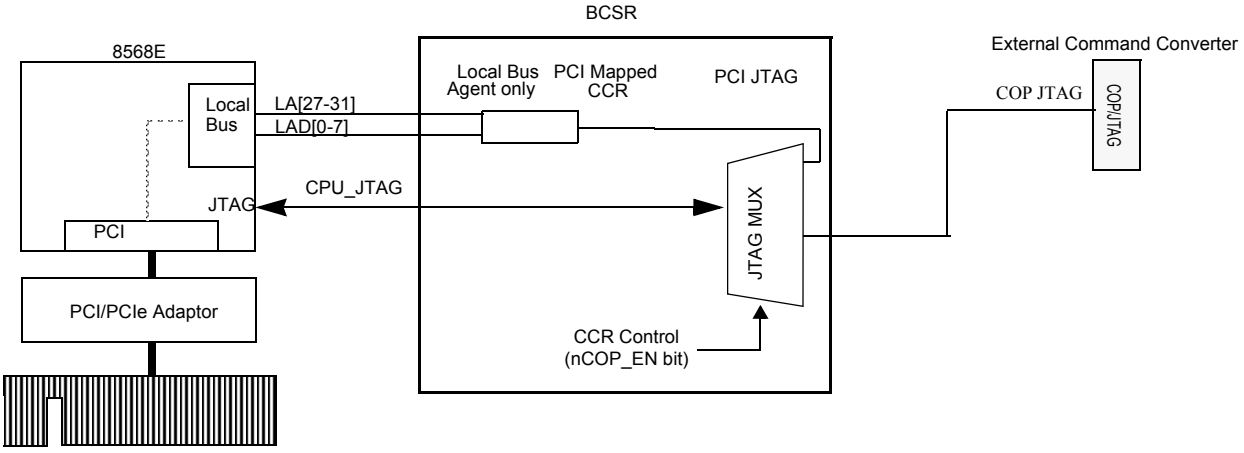


Figure 5-17. JTAG Block diagram

5.13 UART Ports

To assist with development of user's applications and to provide convenient communication channels with both a terminal and a host computer, two RS-232 transceivers are provided on the MPC8568E MDS Processor Board. These transceivers are connected to the MPC8568E device via muxed UART ports (UART0/PCI_REQ3,4; PCI_GNT3,4 and UART1/QE_PC0:3). The implementation is done by the ADM561JRSZ (from Analog Devices), which internally generates the required RS-232 levels from a single 3V3 supply.

The transceivers are enabled by BCSR5. As for the ports, the UART0 port is always enabled, while BCSR5 enables/disables the use of the UART1 port. If the UART1 port is not used, these pins can be used by UPC2 for other functions on the PIB. The UART also features hardware flow control. The RS-232 signals are presented on a single 10-pin header connector. A special cable (included with the MPC8568E MDS Processor Board kit) was prepared to connect between the 10pin header to two 9pin D-Type female connectors. These connectors may be directly connected (via standard serial cable) to any IBM-PC compatible RS-232 port.

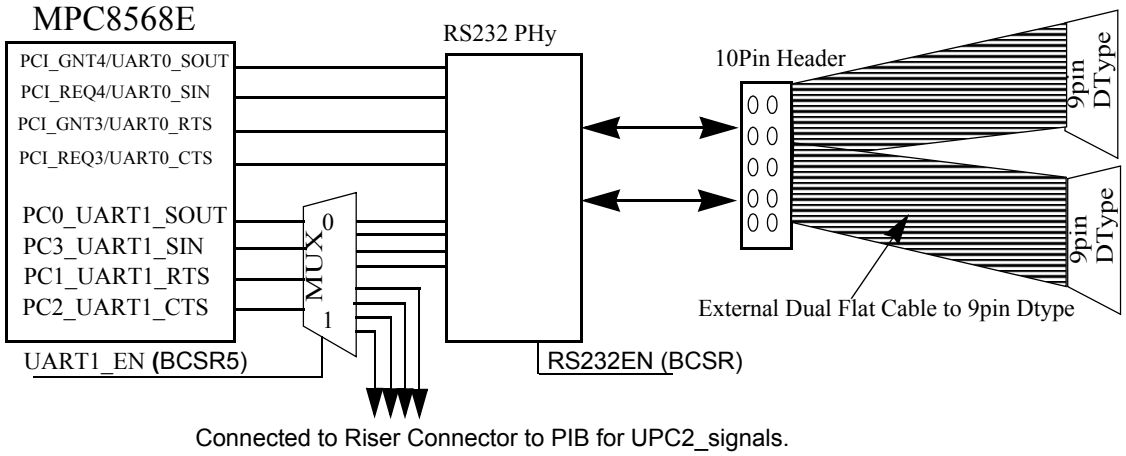


Figure 5-18. RS232 Block Diagram.

5.14 I²C (Dual) Port

The MPC8568E has a dual I²C interfaces (I2C-1 & I2C-2) with multi-master support. Each I²C bus uses a two-wire interface that contains an SCL (Serial Clock) signal and an SDA (Serial Data) signal for data transfer. All devices that are connected to these two signals must have open-drain or open-collector outputs. A logical OR function is performed on both signals with external pull-up resistors located on the MPC8568E MDS Processor Board. See Figure 5-19 for an illustration of the I²C connection scheme.

5.14.1 I2C-1

I2C-1 has five devices connected to it.

- The first is the Boot EEPROM (ST EEPROM M24256-BWDW6TG 256Kbit) which provides configuration settings. Its address is “0x50”
- The second device is the SPD EEPROM (for SODIMM DDR). It is located at address “0x51”. The Serial Presence Detect (SPD) function utilized on a dedicated EEPROM in the SODIMM allows retrieval of the SODIMM-DDR devices configuration data to a program DDR controller.
- The third device is CPU Core Voltage regulator POT which provide digitally controlled Vdd variation. Its address is “0x2C”
- The fourth device is the Real Time Clock (RTC), implemented by Dallas DS1374U-33+ device. It is located at address ‘0x68’. The DS1374U-33+ uses an external 32.768kHz crystal. The DS1374U-33+ includes a 32-bit binary counter to continuously count time in seconds. Separate output pins are provided for an interrupt and a square wave at one of four selectable frequencies: 32.768kHz, 8.192kHz, 4.096kHz and 1Hz. The RTC device is fully programmed via serial bus.
- The fifth device is the PIB mounted any I²C compatible device.

5.14.2 I2C-2

I2C -2 has two devices connected to it.

- The first device is the Board EEPROM. This is a serial Atmel EEPROM AT24C01A-10TU-2.7 128KByte at address ‘0x52’. This device contains all Board history.
- The second device is the PIB mounted any I^2C compatible device.

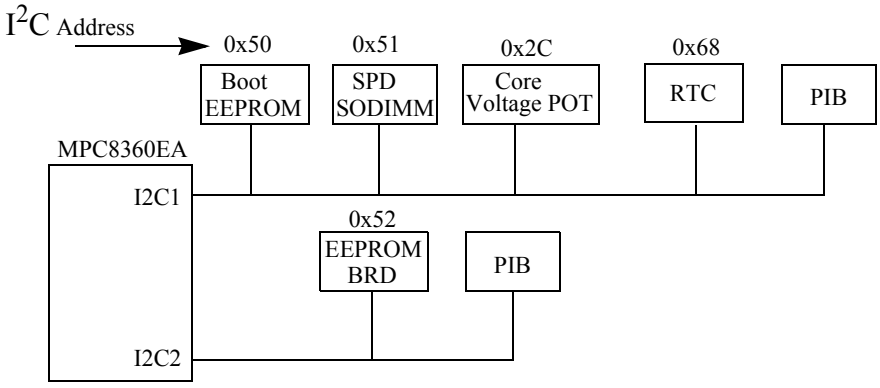


Figure 5-19. Dual I2C Block Diagram

5.15 External Interrupts

There are several external interrupts applied to the MPC8568E via its interrupt controller:

- IRQ 0 (Reserved)
- IRQ 1 (GETH1 - Adr.00000 & TSEC1 - Adr.00010)
- IRQ 2 (GETH2 - Adr.00001 & TSEC2 - Adr.00011)
- IRQ3 - RTC
- IRQ 4,5,6,7 - PCI Bus Interrupts

5.15.1 PIB Interrupt

The PIB has 4 interrupts IRQ4, IRQ5, IRQ6, IRQ7. In PCI Host mode they are called IRQW, IRQX, IRQY & IRQZ appropriately. Each PMC module can use all four of the above interrupts.

5.15.2 PCI Interrupt

Each PCI slot on the PIB can generate up to four interrupts, for a total of sixteen (4 slots x 4 interrupts each). Each PCI expansion board can generate an interrupt at any given time. When the MPC8568E MDS Processor Board is in Agent Mode, only the INTA is used.

5.15.3 RTC Interrupt

The RTC (real time clock) device used is DS1374 from Maxim. It is connected to IRQ3, and can be programmed via the I2C - 1 bus.

5.15.4 FLASH Interrupt

The FLASH memory is connected to IRQ6. Invoking this interrupt indicates that the programming of the flash was done.

5.15.5 JTAG/COP Interrupt

The JTAG/COP Connector uses two interrupts: IRQ6 & IRQ7 for Check Stop In/Out. It is used when working with an external debugger.

5.15.6 GETH Interrupt

GETH1 has IRQ1 as an interrupt, and GETH2 has IRQ2 as an interrupt. Invoking any one of these interrupts indicates that data has been transferred via the specific GETH port.

5.16 Power Supply

The MPC8568E MDS Processor Board power supply provides all necessary voltages for correct operation of the MPC8568E device, the DDR, eTSEC, Altera CPLD, and all on-board peripheral devices.

5.16.1 Primary Power Supply

There are 3 possible sources of power:

- External 5V Power Supply.
- 5V Power supplied from PCI/PCIe adaptor Edge Connector/PC Extra Power Connector via MPC8568E MDS Processor Board Riser Connectors
- 5V Power supplied from PIB PS via MPC8568E MDS Processor Board Riser Connectors.
- Power On/Off push button provides the corresponding function

The External 5V Power Supply is a standard power supply. Its parameters are:

- Vin = 100V - 240V AC @ 47-63Hz
- Iin = 2A
- OUTPUT = 5VDCout ±5% @ 8A

5.16.2 MPC8568E MDS Processor Board Power Supply Structure

The MPC8568E MDS Processor Board supplies power via the following:

- Power Module DC/DC converter PTH05T210WAD from TI to produce MPC8568E 1.1V voltage Core @ 30A.

- Power Module DC/DC converter DNM04S0A0R10PFC made by Delta to produce 3.3V @ 10A.
- Switching regulator TPS51116PWP from TI to produce DDRII/I GVDD (1.8/2.5V@10A) and corresponding termination and reference voltages (V_{TT} = 0.9/1.25V @ 2A, V_{REF} = 0.9/1.25V@10mA)
- Set LDO regulators (MIC49300WR from Micrel, LT1764EQ-2.5PBF from Linear Tech and MIC37139-1.8YS from Micrel) provides all necessary TSEC/GETH PHY's VDDO, VDDOH, AVDD and DVDDL core voltages (2.5V DC @ 3A, 1V DC @ 3A), LVDD and TVDD voltages (user selectable 3V3 or 2.5V) as well as 1.8V DC @ 1.5A voltage used by PCIe Mux/Demux Switches
- Provides necessary visual indication, and power sequence functions.

5.16.3 Power Supply Operation

The primary 5VDC PS used is PS5080APL04/S3+PSE from Sceptrepower Co.

When a 5V Power source is connected to the board yellow LED "5VIN" is illuminated.

The Power-On sequence starts after depressing on the push-button "PWR_ON/OFF" (SW5). The MPC8568E 1.1V core voltage is generated first. The OVDD (3V3) activates second with a delay so that it should not reach 1V before VDD reaches 1V. All the above voltages (TSEC's, GETH, LVDD, TVDD are derived from the 3.3V power supply using LDO regulators. After all on-board voltages have been produced successfully, the green LED ("PWR_ON" - LD7) indication is illuminated. The MAX6886ETP+ device (U4) from Maxim does voltage-monitoring. If at least one of the voltages does not meet certain conditions, the device will not provide the POWER_GOOD signal to U76 (EPM7064STC44-10N from Altera), which in turn causes all on-board PS's to be switched off. In this case, the red LED (LD6) "PWR_FAILED" is illuminated, and next Power On should be done by re-connection of the primary PS.

The U76 device also provides a "forced time-out" function between Power-Off/Power-On cycles to prevent following Power-On sequence from an undefined state of the power bulk capacitors.

The MPC8568E LVDD and TVDD voltage groups are used for eTSEC's and GETH I/F's. 3.3V or 2.5V values must be supplied to these interfaces independently, in order to test them in both voltages. Therefore the jumpers J16-"TSEC-VSEL" and J17-"TVDD-VSEL" are mounted on board.

Each of the converters and regulators used as on-board power supply have embedded over-current, -voltage, and -temperature protection.

As mentioned earlier, the processor board has a CPU Core Voltage regulator potentiometer (POT), which could provide digitally controlled Vdd variation. To use this, write a data value to the POT (I2C-1 address 2Ch). The range of the voltage is 0.989V/Data = 240d to 1.252V/Data = 66d. Each step (1bit) will change the Vdd voltage by about 2 mV.

The ability to measure the amount of current consumed by the Core VDD (1.1V) is provided as follows:

- By measuring the voltage drop on the 1.5 mOHm Hall Effect Based Linear Current Sensor in the corresponding circuit (ACS706ELC-20A device from Allegro) by following formula:

  Icore(A)= [Vout(mV)-2500]/100 (Tolerance <=10%)

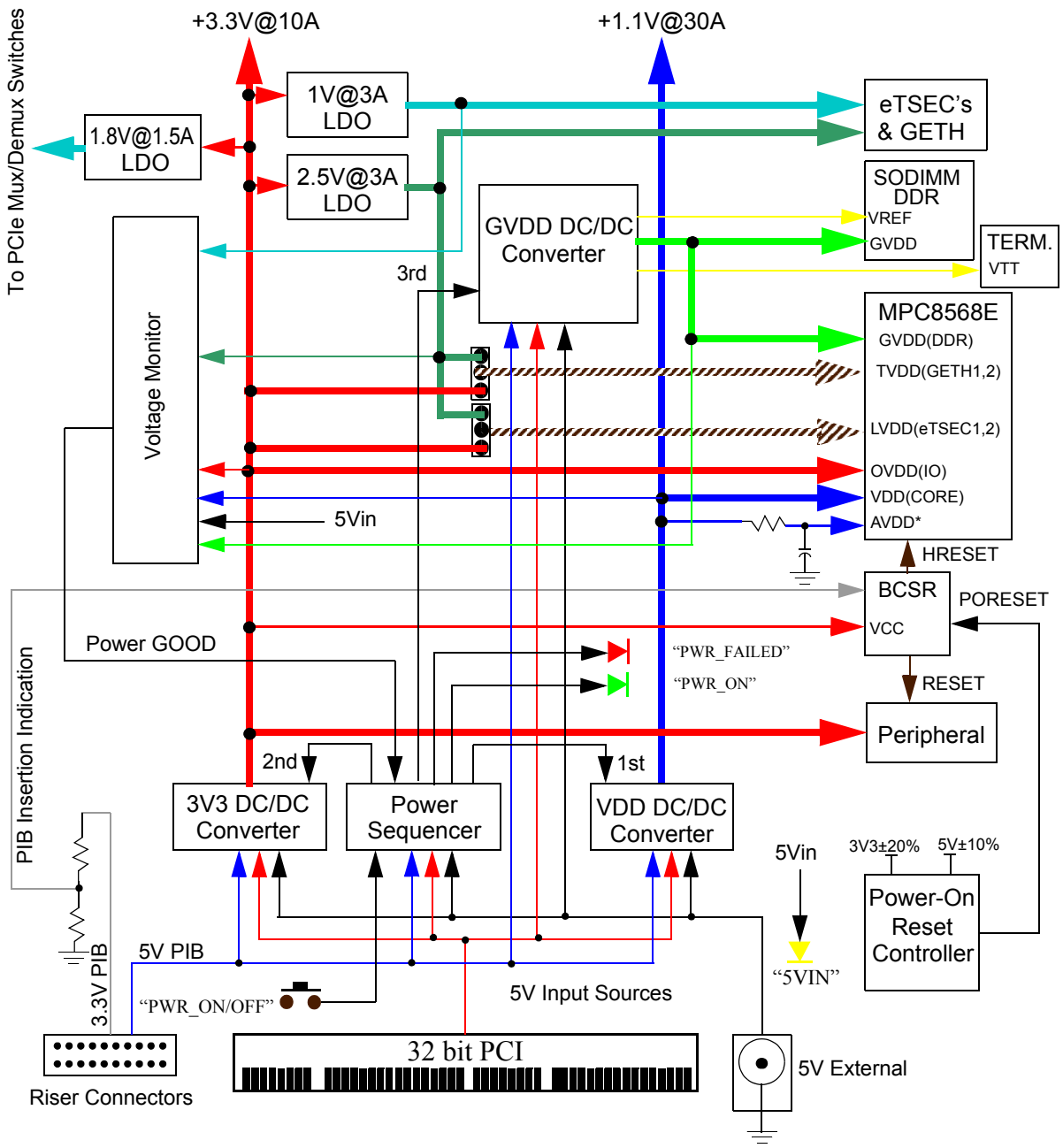


Figure 5-20. Power Distribution on the MPC8568E MDS Processor Board

Chapter 6
Working with the PIB

6.1 Platform I/O Board Concept

The MPC8568E MDS Processor Board, together with the MPC8Xxx MDS Processor Board, form the MPC8Xxx Modular Development System (MDS). The MDS enables software programmers to develop software for the 8Xxx architecture. A block diagram of the PIB with a Processor Board is shown in Figure 6-1 on page 6-2.

The PIB provides more capabilities for developing 8Xxx software than the MPC8Xxx Processor Board alone by allowing an MPC8Xxx Processor Board to be configured as a Host, with up to four PCI-compatible boards as Agents, connected to PCI slots (via PMC-PCI adaptors or via the Expansion adaptor) on the PIB motherboard.

The PIB also allows an MPC8Xxx Processor Board to be used in a back plane configuration, and provides room and connections for additional modules. Power is provided by the PIB, which also provides additional signal connections via the back plane (if used), and optical GETH connectors on the front plane side of the PIB.

In summary, the PIB provides the following (list specific for the MPC8568E MDS Processor Board):

- Support for the MPC8568E as a PCI Host.
- Support for any PCI-compatible agent module connected to the PCI bus.
- Supports the operation of the E1/T1 module on PMC0 or PMC1.
- Supports the operation of the Quad-OC3 module on PMC0 or PMC1.
- Provides 6 RMII ports for UCC1-5, and UCC8
- Allows a view of all the QE signals through PMC0, PMC1

In the block diagram in Figure 6-1 below, note carefully the specific communication lines that are connected with each PMCx slot. For example, the PCI of the MPC8568E is connected to PCI2 of the PIB, which is connected to PMC2 and PMC3. The specific connections dictate which modules can be connected to which PMC slot.

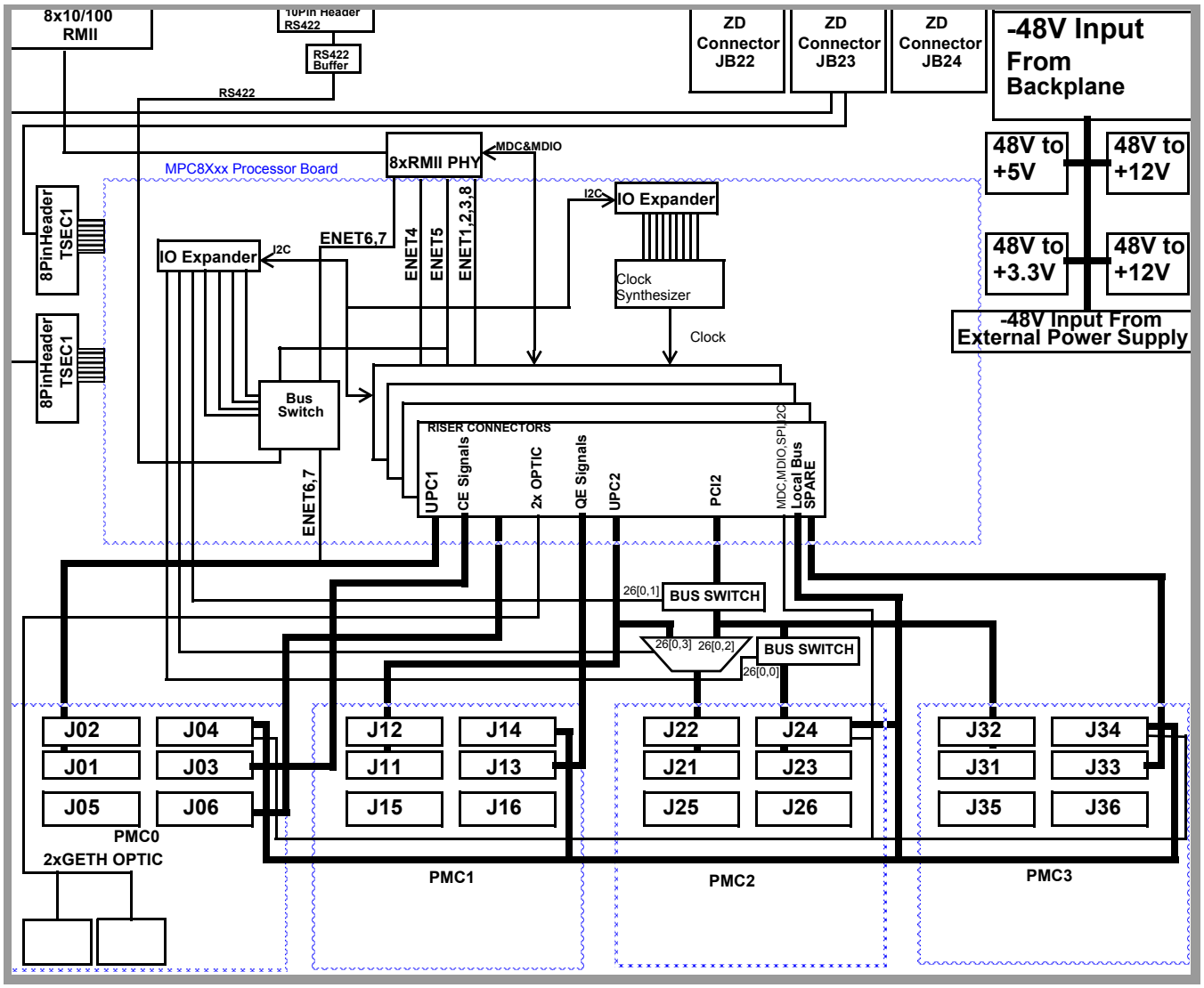


Figure 6-1. PIB Block Diagram, with Processor Board

6.2 MPC8568E MDS Processor Board as Host on PIB

In order for the MPC8568E MDS Processor Board to work as a host, the user must configure it to do so (see See “SW2 Configuration” on page 3-4.). This is the default configuration. This means that both the PCI and system clock are supplied by the processor board.

In addition, the Host Processor Board configures the PCI communication bus on the PIB, identifies the various agents and modules connected to the PIB, and allocates resources for them. A list of signals between the PIB and the Processor Board is supplied in Section 6.5, below.

It is important to note that an external debugger must be connected to the JTAG/COP connector on the board on which the processor to be debugged is found.

6.3 MPC8568E MDS Processor Board as Agent on PIB

In order for the MPC8568E MDS Processor Board to work as an agent, follow the instructions in Section 2.2.2.2 on page 2-9. Note that the agent mode is ***not*** the default configuration. In agent mode, the PCI clock is supplied by an outside source, but the system clock is supplied by the agent processor board.

A list of signals between the PIB and the Processor Board is supplied in Section 6.5, below.

It is important to note that an external debugger must be connected to the JTAG/COP connector on the board on which the processor to be debugged is found, even if it's an agent board.

6.4 Working with a TDM module on the PIB

If you will be working with a TDM module on the PIB (Freescale's PQ-MDS-T1 module), a few adjustments are necessary:

- You must install an additional PMC-to-PMC adaptor on the PMC0 slot, and
- You must take into consideration the locations of signals on the PMC-to-PMC adaptor.

6.4.1 Installing the PMC-to-PMC adaptor

1. Fasten spacer-extenders to both the long and the short spacers of the PQ-MDS-T1 module, as shown in Figure 6-2 and Figure 6-3:

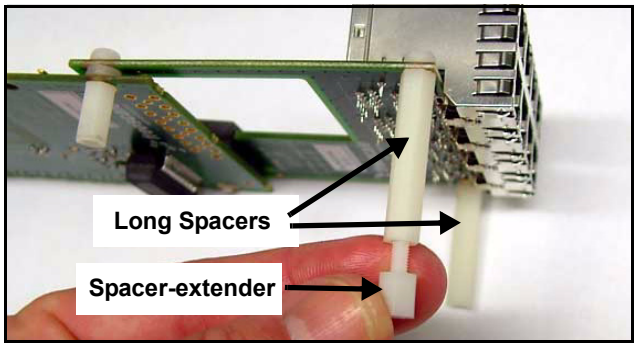


Figure 6-2. Fastening spacer-extenders to long spacers on the PQ-MDS-T1 module

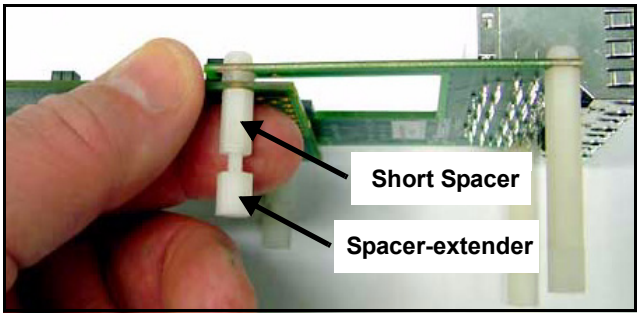


Figure 6-3. Fastening spacer-extenders to short spacers on the PQ-MDS-T1 module

2. Fasten PMC-to-PMC adaptor to PIB as shown in Figure 6-4 and Figure 6-5 (fasten to the PMC0 slot only). Ensure that the four latches are tightened properly, in addition to ensuring that the flat pin-plug fits properly to its socket.
3. Tighten by pressing down by hand until the adaptor clicks in place. You can then fasten the PQ-MDS-T1 module to the PMC-to-PMC adaptor, as shown in Figure 6-6.

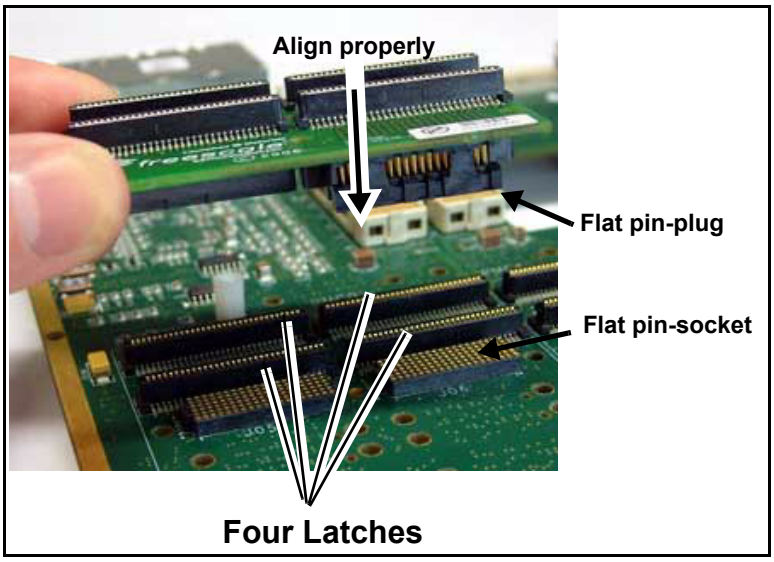


Figure 6-4. Fastening PMC-to-PMC adaptor (A)

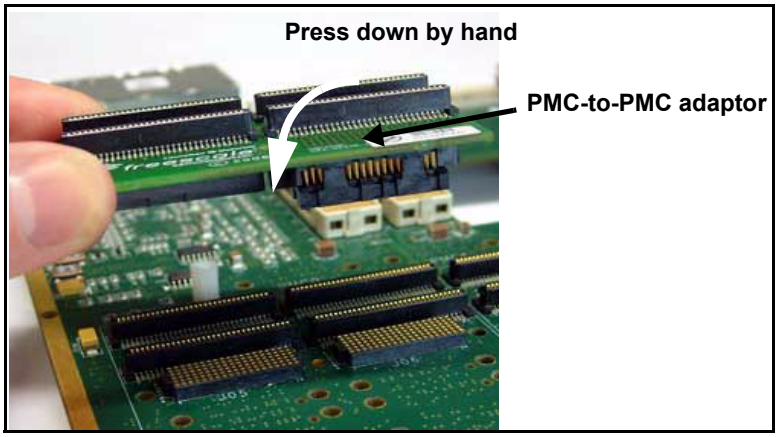


Figure 6-5. Fastening PMC-to-PMC adaptor (A)

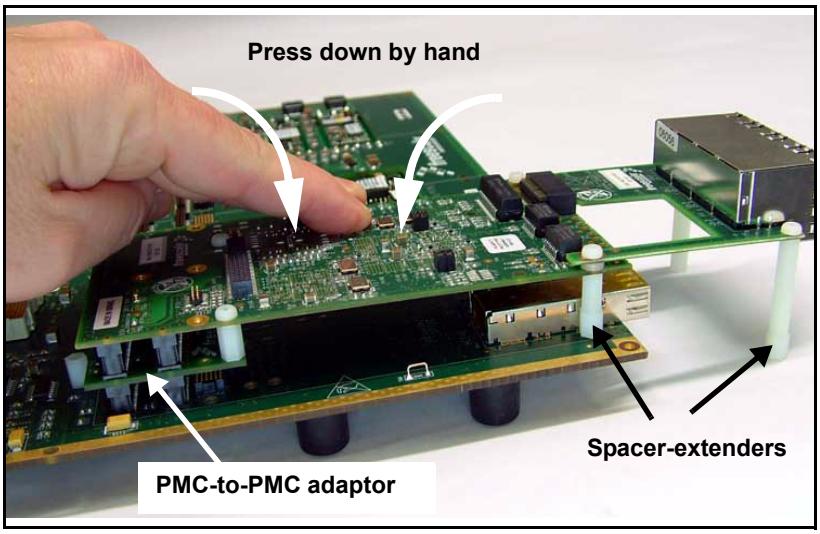


Figure 6-6. Fastening the PQS-MD-T1 module to the PIB, when the host is an MPC8568E board

6.4.2 Signals on the PMC-to-PMC adaptor

Table 6-1 below shows the signal locations for the PMC-to-PMC adaptor. It is important to take this into consideration when working with the PQ-MDS-T1 module.

The first column shows the locations of the pins on the MPC8568E (pins not listed do not have a connection to the processor board). The second column shows the location of the corresponding pins on the riser connections on the bottom of the MPC8568E MDS Processor Board. The third column shows the location of the corresponding pins on the bottom of the PMC-to-PMC adaptor, and the fourth column shows the location of the corresponding pins on the top of the PMC-to-PMC adaptor. These are the pins that connect to the PQ-MDS-T1 module.

Table 6-1. Configuring the Board for TDM connections

MPC8568E QE - PIN	RISER	PMC-to-PMC adaptor BOTTOM	PMC-to-PMC adaptor TOP
PE11	P13-A14	PMC0-P3[46]	PMC0-J2[13]
PE14	P13-A19	PMC0-P3[52]	PMC0-J1[55]
PE15	P13-A17	PMC0-P3[48]	PMC0-J1[58]
PE16	P13-B14	PMC0-P3[60]	PMC0-J1[4]
PE18	P13-E1	XMC0-P6[E13]	PMC0-J2[61]
PC7	P12[C28]	PMC0-P3[58]	PMC0-J3[11]
PC8	P12[B26]	XMC0-P6[D13]	PMC0-J3[17]
PC9	P12[E26]	XMC0-P6[D9]	PMC0-J3[16]

Table 6-1. Configuring the Board for TDM connections (continued)

MPC8568E QE - PIN	RISER	PMC-to-PMC adaptor BOTTOM	PMC-to-PMC adaptor TOP
PC10	P12[F25]	XMC0-P6[E11]	PMC0-J3[18]
PD10	P12[D23]	PMC0-P3[34]	PMC0-J2[46]
PD11	P12[C26]	PMC0-P3[30]	PMC0-J1[48]
PD12	P12[D25]	XMC0-P6[D11]	PMC0-J2[19]
PC27	P12[F30]	PMC0-P3[31]	PMC0-J2[57]
PC30	P12[G26]	PMC0-P3[59]	PMC0-J2[55]
PC31	P12[A22]	PMC0-P3[41]	PMC0-J1[16]
PD4	P12[D20]	XMC0-P6[E9]	PMC0-J1[10]
PD5	P12[F28]	XMC0-P6[D17]	PMC0-J2[51]
PD6	P12[D19]	PMC0-P2[48]	None
PD7	P12[C18]	PMC0-P3[25]	PMC0-J3[25]
PD16	P12[E29]	XMC0-P6[E17]	PMC0-J2[23]
PD17	P12[A22]	PMC0-P3[53]	PMC0-J1[47]
PD18	P12[K19]	PMC0-P3[4]	PMC0-J3[4]
PD19	P12[D22]	PMC0-P3[6]	PMC0-J3[12]
PD20	P12[K20]	PMC0-P3[10]	PMC0-J3[10]
PD26	P12[H24]	PMC0-P2[20]	None
PD27	P12[G28]	PMC0-P3[29]	PMC0-J2[52]
PD22	P13[C1]	PMC0-P3[43]	PMC0-J3[43]
PA27	P13-J10	PMC0-P1[41]	PMC0-J1[33]
PA28	P13-J21	PMC0-P1[16]	PMC0-J2[35]
PA29	P13-J15	PMC0-P1[55]	PMC0-J2[39]
PA30	P13-G16	PMC0-P2[55]	PMC0-J2[45]
PA31	P13-F9	PMC0-P1[29]	PMC0-J1[52]
PB4	P13-F8	PMC0-P2[29]	PMC0-J2[42]
PB6	P13-H10	PMC0-P1[53]	PMC0-J2[34]
PB9	P13-H18	PMC0-P1[60]	PMC0-J3[53]
PB10	P13-H20	PMC0-P1[59]	PMC0-J3[59]
PB11	P13-H21	PMC0-P2[49]	PMC0-J3[49]
PB12	P13-H23	PMC0-P2[8]	PMC0-J3[55]

Table 6-1. Configuring the Board for TDM connections (continued)

MPC8568E QE - PIN	RISER	PMC-to-PMC adaptor BOTTOM	PMC-to-PMC adaptor TOP
PB13	P13-H24	PMC0-P2[10]	PMC0-J3[61]
PB17	P13-F30	PMC0-P2[45]	PMC0-J3[41]
PB18	P13-G7	PMC0-P1[52]	PMC0-J3[37]
PB19	P13-G8	PMC0-P2[43]	PMC0-J3[35]
PB20	P13-G10	PMC0-P2[32]	PMC0-J3[31]
PB21	P13-G11	PMC0-P1[26]	PMC0-J3[7]
PB22	P12-A1	PMC0-P3[1]	PMC0-J2[58]
PB23	P13-F28	PMC0-P3[23]	PMC0-J2[26]
PB24	P13-G29	PMC0-P3[19]	PMC0-J1[49]
PB25	P13-J18	PMC0-P3[17]	PMC0-J2[48]
PB26	P13-J19	PMC0-P3[11]	PMC0-J1[32]
PB27	P12-A3	PMC0-P3[7]	PMC0-J2[29]
PB28	P13-F27	PMC0-P3[5]	PMC0-J2[20]
PF11	P12-B23	PMC0-P3[16]	PMC0-J3[34]
PF14	P12-C10	PMC0-P3[55]	PMC0-J1[54]
PF15	P12-B26	PMC0-P3[18]	PMC0-J1[41]
PF16	P12-D7	PMC0-P3[37]	PMC0-J3[30]
PF18	P13-A10	PMC0-P3[22]	PMC0-J1[20]

6.5 MPC8568E MDS Processor Board - PIB Signals

The table below shows the correspondence between signals on the MPC8568E and those on the PIB.

- PMC - is the number of the pin on the PMC slot of the PIB.
- Riser - is the number of the pin on the MPC8568E MDS Processor Board that connects to the PIB.
- Signal Name - is the name of the signal on the PIB that uses the indicated pin. This is not necessarily the name of the signal on the MPC8568E device, or on the specific module connected to the PMCx slot on the PIB.

Table 6-2. Processor Board - PIB Signals

PMC	Riser	Signal Name
---	P12-E7	nPRST
PMCx - J4-21	P14-F15	BLA16
PMCx - J4-22	P14-E14	BLA17
PMCx - J4-23	P14-D13	BLA18
PMCx - J4-24	P14-C12	BLA19
PMCx - J4-27	P14-B15	BLA20
PMCx - J4-26	P14-A10	BLA21
PMCx - J4-29	P14-K12	BLA22
PMCx - J4-28	P14-J15	BLA23
PMCx - J4-31	P14-H21	BLA24
PMCx - J4-32	P14-G19	BLA25
PMCx - J4-33	P14-F16	BLA26
PMCx - J4-34	P14-E15	BLA27
PMCx - J4-37	P14-D14	BLA28
PMCx - J4-36	P14-C13	BLA29
PMCx - J4-39	P14-B17	BLA30
PMCx - J4-38	P14-A11	BLA31
PMCx - J4-1	P14-F18	BLD0
PMCx - J4-2	P14-E17	BLD1
PMCx - J4-3	P14-D16	BLD2
PMCx - J4-4	P14-C15	BLD3
PMCx - J4-7	P14-B18	BLD4
PMCx - J4-6	P14-A13	BLD5
PMCx - J4-9	P14-K14	BLD6
PMCx - J4-8	P14-J16	BLD7
PMCx - J4-11	P14-H23	BLD8
PMCx - J4-12	P14-G20	BLD9
PMCx - J4-13	P14-F19	BLD10
PMCx - J4-14	P14-E18	BLD11
PMCx - J4-17	P14-D17	BLD12

Table 6-2. Processor Board - PIB Signals

PMC	Riser	Signal Name
---	P12-E7	nPRST
PMCx - J4-16	P14-C16	BLD13
PMCx - J4-19	P14-B20	BLD14
PMCx - J4-18	P14-A14	BLD15
PMCx - J4-64	P12-C19	XI2C1_DATA
PMCx - J4-62	P12-C21	XI2C1_CLK
PMCx - J4-64	P14-C19	XI2C2_DATA
PMCx - J4-62	P14-C21	XI2C2_CLK
PMC1 - J4-58	P14-A26	INTA/UPC2-ADDR[0]
PMCx - J4-42	P12-K11	LCS4
PMCx - J4-44	P12-J11	LCS5
PMCx - J4-41	P14-F13	LGPL0
PMCx - J4-43	P14-E12	LGPL1
PMCx - J4-47	P14-D8	LGPL2
PMCx - J4-49	P14-C10	LGPL3
PMCx - J4-51	P14-B14	LGPL4
PMCx - J4-53	P14-A8	LGPL5
PMCx - J4-59	P14-K10	LWE0
PMCx - J4-46	P14-J13	LWE1
PMCx - J4-57	P14-D10	RESET
PMCx - J4-52	P14-H14	UART_CTS1
PMCx - J4-48	P14-H12	UART_RTS1
PMCx - J4-54	P14-H9	UART_SIN1
PMCx - J4-56	P14-H10	UART_SOUT1
PMC0/1- J4-5	P12-G22	UPC2-RxDATA[12]
PMC0-J1-64	P14-K26	SPI_MOSI
PMC0-J2-64	P14-G1	SPI_MISO
PMC(0-3)-J4-63	P14-C3	SPI_SEL
PMC0-J3-28	P14-C1	SPI_CLK
PMC0-J3-40	P14-G7	MDIO

Table 6-2. Processor Board - PIB Signals

PMC	Riser	Signal Name
---	P12-E7	nPRST
PMC0-J3-24	P14-G5	MDC
PMC0-J3-48	No Uart2 on PIB	UART_RTS2
PMC0-J3-52	No Uart2 on PIB	UART_CTS2
PMC0-J3-54	No Uart2 on PIB	UART_SIN2
PMC0-J3-56	No Uart2 on PIB	UART_SOUT2

Chapter 7
Replacing Devices

This chapter provides instructions on replacing various devices on the MPC8568E MDS Processor Board.

7.1 Replacing Flash Memory

To remove the flash memory, follow the instructions below in Figure 7-1. to Figure 7-4. below (in that order). The flash memory can be changed no more than 50 times.

To replace the flash memory, follow the instructions in reverse order (Figure 7-4. to Figure 7-1.).

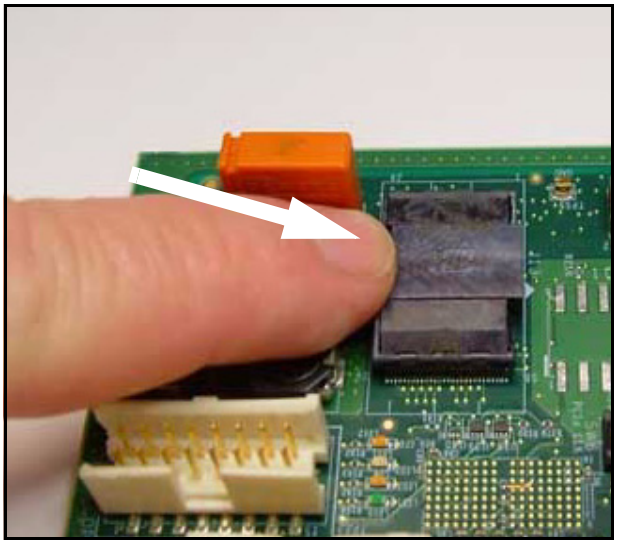


Figure 7-1. Flash Memory - push to dislodge casing

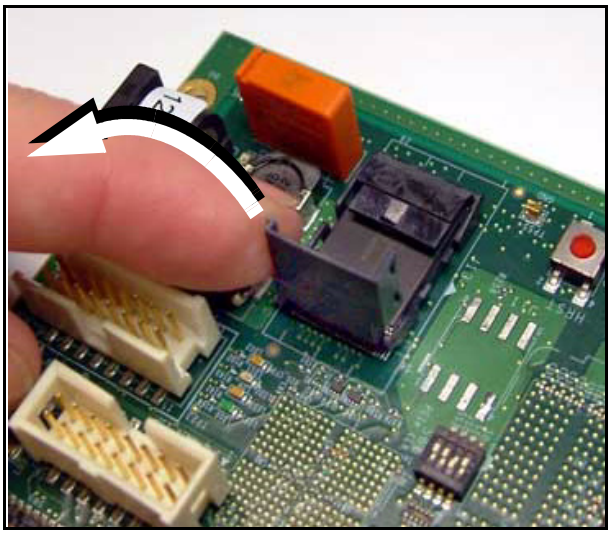


Figure 7-2. Flash Memory - open casing

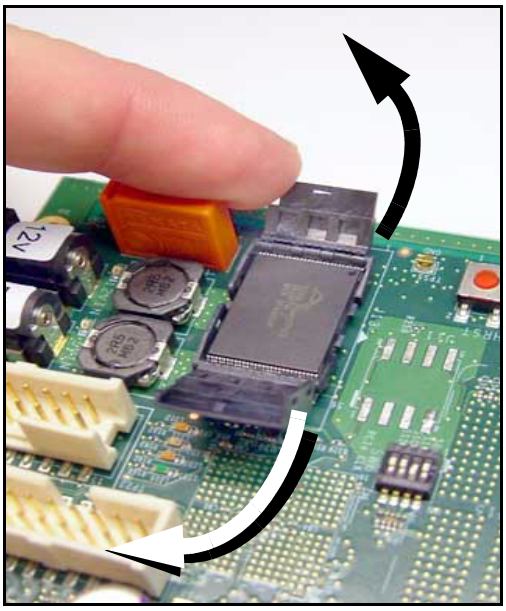


Figure 7-3. Flash Memory - open casing

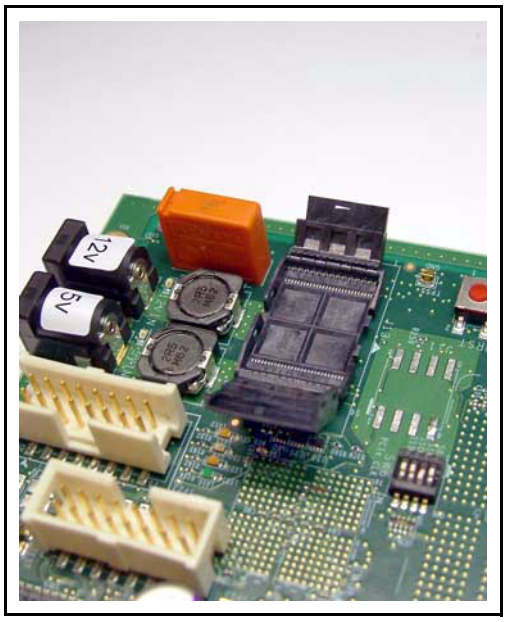


Figure 7-4. Flash Memory - unit removed

7.1.1 Cleaning Flash Memory

If there is some decrease in performance from the flash memory unit, the socket may need to be cleaned. Do this by dipping a tooth pick dipped in isopropyl alcohol, and gently removing any residual debris from the flash memory socket.

7.2 Replacing SODIMM unit

To remove or replace the SODIMM unit, follow the instructions in Figure 7-5. through Figure 7-7., in that order.

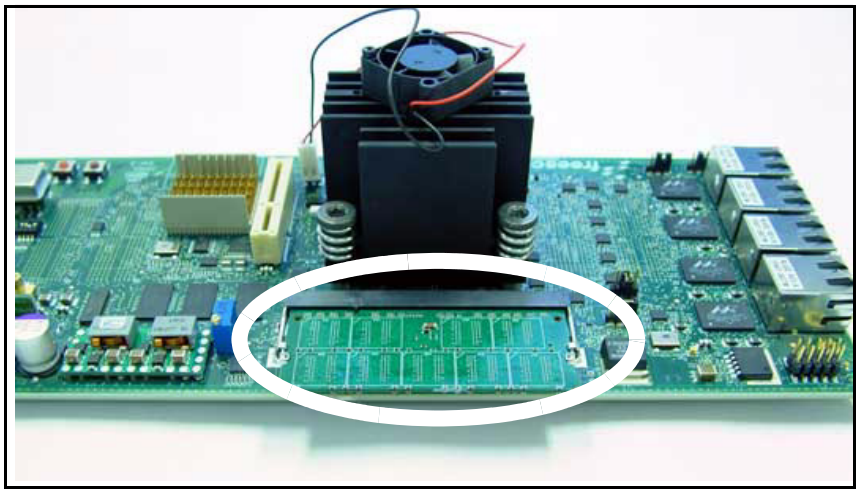


Figure 7-5. SODIMM Memory

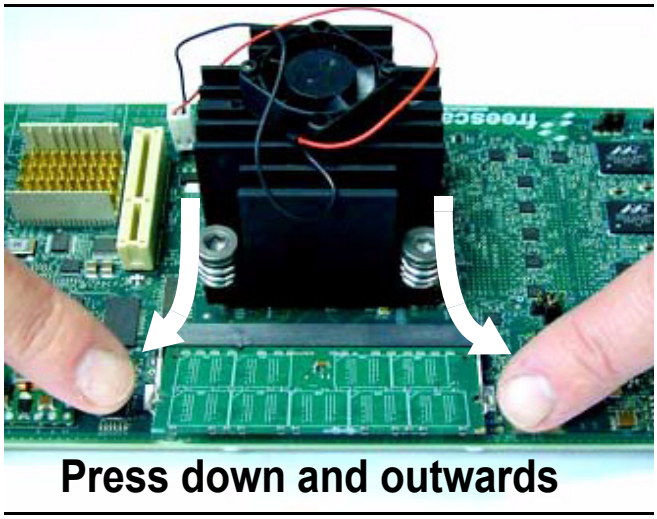


Figure 7-6. SODIMM Memory - release retaining clips

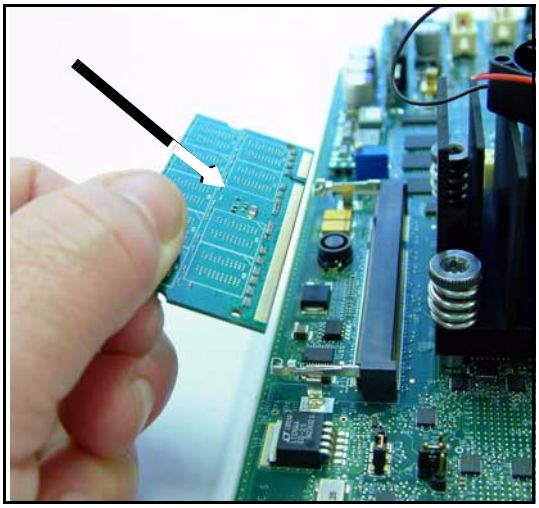


Figure 7-7. SODIMM Memory - remove/replace unit

7.3 Replacing MPC8568E Processor

To remove the MPC8568E processor, follow the instructions in Figure 7-8. to Figure 7-13. below, then remove the chip.

To replace the MPC8568E processor, align the chip properly as shown in Figure 7-13. (note the location of the alignment indicator - a small triangle on the corner of the chip), then follow the instructions in Figure 7-11. to Figure 7-8. below (in that order).

Note that the Allen wrench is provided in the tool kit.

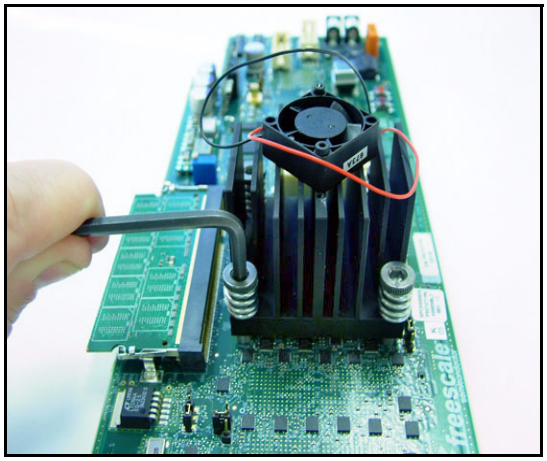


Figure 7-8. Loosen Allen screws

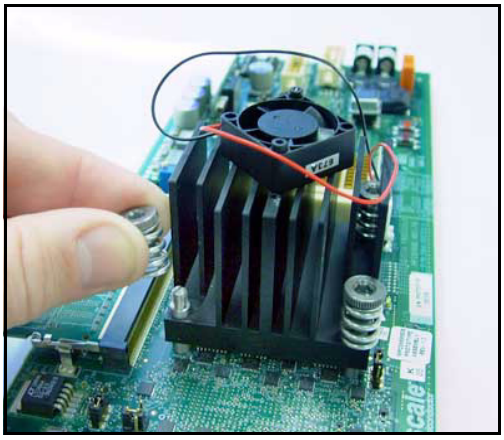


Figure 7-9. Remove Allen screws by hand

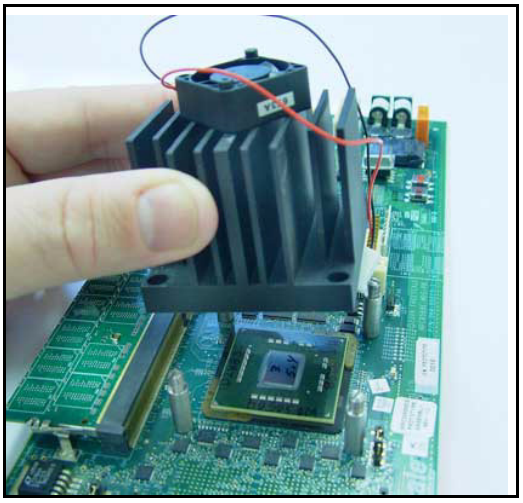


Figure 7-10. Remove heat sink

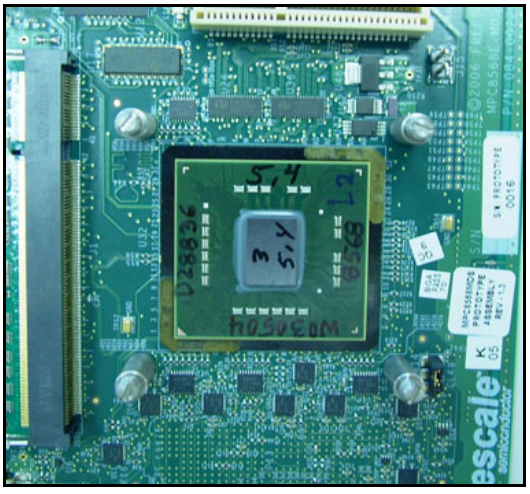


Figure 7-11. Heat sink removed

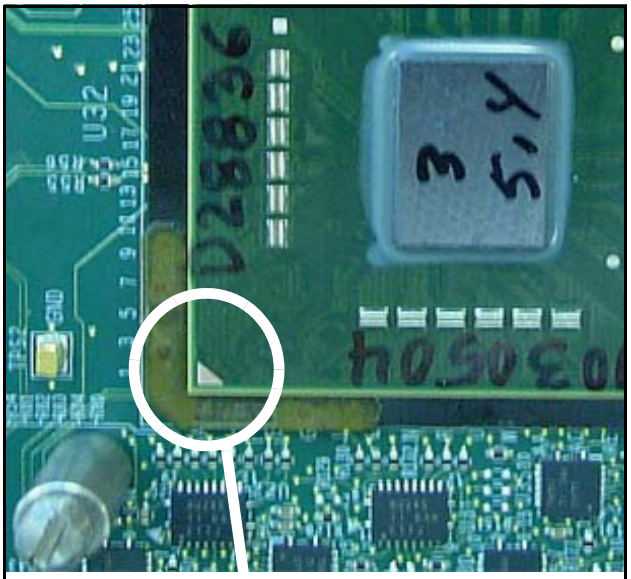


Figure 7-12. Alignment Indicator

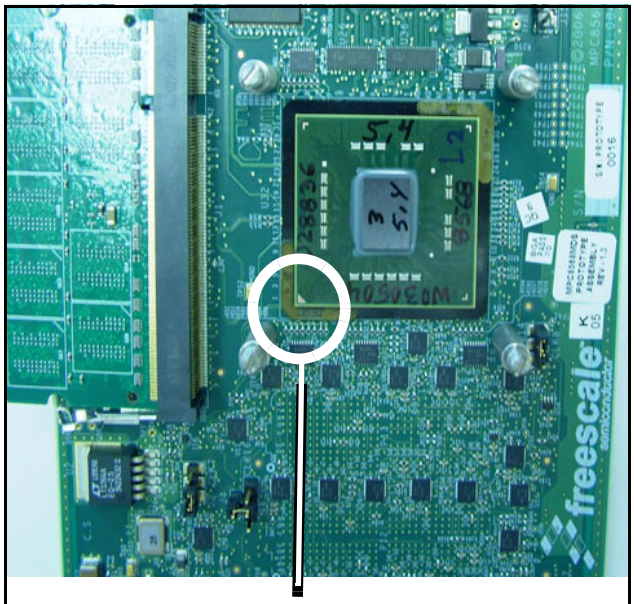


Figure 7-13. Chip alignment: Correct

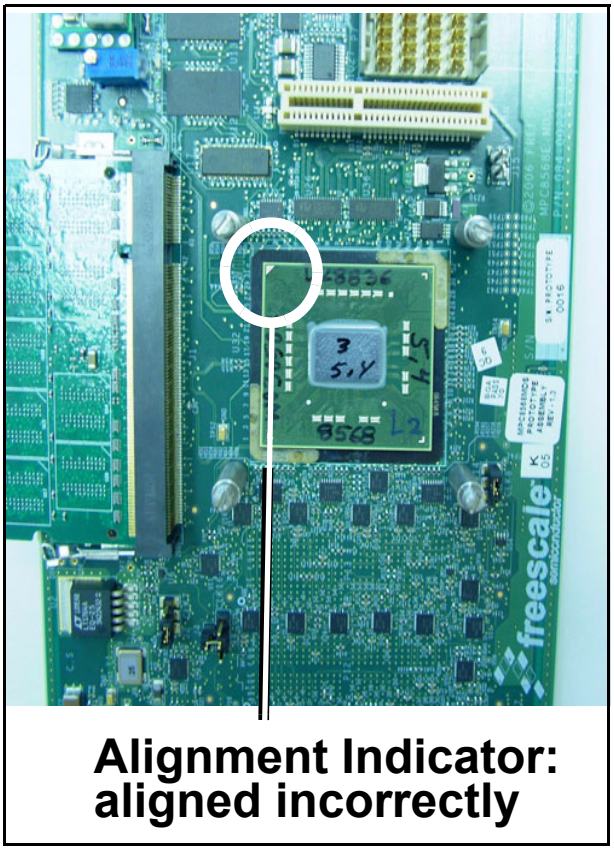


Figure 7-14. Chip alignment: Incorrect